IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

FINESSE WIRELESS, LLC, (CAUSE NO. 2:21-CV-316-JRG
)
Plaintiff, (
)
vs. (
)
AT&T MOBILITY, LLC, et al., (MARSHALL, TEXAS
) JANUARY 10, 2023
Defendants.) 8:30 A.M.

VOLUME 2

TRIAL ON THE MERITS

BEFORE THE HONORABLE RODNEY GILSTRAP
UNITED STATES CHIEF DISTRICT JUDGE

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EXAMINATION

THE COURT: Be seated, please. Are the parties prepared to read into the record those items from the list of pre-admitted exhibits used during yesterday's portion of the trial?

MS. FAIR: Yes, Your Honor.

THE COURT: Please proceed.

MS. FAIR: I will be reading all of the exhibits that were admitted, and I can designate which ones were admitted by the Defendants and which were admitted by the Plaintiff if that suits the Court.

THE COURT: That is acceptable.

MS. FAIR: The Plaintiff admitted all the numbers I'm about to read: PX 3, 4, 343, 135, 77, 351, 352, 337, 135, 117, 269, 370, 104, 242, 886, 954, 999, 674, 678, 690, 995, 834, 839, and 917. Those are the exhibits that were admitted by the Plaintiff yesterday.

For the Defendant, these are all DX numbers: 160, 151, 154, and 345. That's the complete list for both parties, Your Honor.

THE COURT: All right. Thank you, Ms. Fair.

Do Defendants and Intervenors have any objection to that rendition?

MR. DACUS: We do not, Your Honor.

THE COURT: All right. Thank you, counsel.

Let me cover a matter before we bring the jury in.

When I met with counsel in chambers yesterday, an issue arose regarding the Defendants' motion for leave to narrow its invalidity defenses and prior art which was filed Sunday evening with the jury being brought in yesterday, Monday the 9th. This was filed on the 8th.

I talked with counsel about this in chambers yesterday. In essence, I think it's undisputed that Defendants had a significantly larger invalidity case until just the very eve of trial at which time they've elected to drop all their invalidity defenses except very targeted 103 obviousness defenses. I think it's fair to say that the Defendants have elected to significantly and substantially narrow their invalidity case.

The issue arose as to whether that was proper or not. The issue arose as to whether Plaintiffs were unfairly harmed by the very late narrowing such that they had expended considerable time, effort, and resources in preparing to defend those portions of the invalidity assertions from Defendant that had been dropped.

The Court noted, when it discussed these issues with the parties that, on the one hand, the Court encourages and does not want to chill efforts between parties to narrow their cases and recognizes that on the eve of trial narrowing is a common occurrence. On the other hand, it's not fair for one party to lay behind the log and drop positions, whether it's

Plaintiff or Defendant, on the very eve of trial after the other side has expended time and resources preparing for things that won't be presented to the jury which up until just before trial they were under the belief would be presented to the jury.

In this case the narrowing stems from a couple of factors. There was a summary judgment ruling brought to me by way of an R and R from the magistrate judge which I adopted which included an additional claim construction position and more or less in the posture of an *02 Micro* construction. That happened late in the case, and there was some fair adjusting from that. But there was also information known to the Defendants as early as late November that could have and should have prompted narrowing long before the 8th of January with trial to begin on the 9th of January.

All things considered, I've looked at the positions of the parties and I've considered what they've told me by way of informal argument in chambers. Plaintiffs have represented that they expended among their various trial team members 190 hours of time preparing for those invalidity issues that were dropped by Defendant. Plaintiffs have suggested the Court should impose a monetary sanction. They've also suggested the Court should somehow limit or narrow the trial time or other time requirements on the Defendant during the remainder of this trial.

I think the fair thing to do in this case is as follows: I'm not going to restrict the Defendants' trial time. I think to some extent their narrowing is reasonable given the timing. I think to some extent their narrowing is unreasonable and should have occurred well before it did.

In light of the totality of the circumstances, I'm going to order the Defendants to compensate Plaintiff's counsel up to an amount of $25,000 for the time and resources spent by Plaintiff preparing to defend against the invalidity issues that were dropped late in the case.

I think that's targeted, tailored, and appropriate, understanding that there is some merit to Plaintiff's position, there also is merit to Defendants' position and justification for what they did. This is a situation where there are valid points on both sides. On balance, Plaintiff has been required to prepare for things late, late in the case that should have known about earlier, but those are not completely unjustified.

So rather than impede Defendants' ability to have the entirety of the time the Court's allocated it for trial or rather than award a market rate for 190 hours, the Court thinks compensation up to but not beyond a total of $25,000 is appropriate here, and that's my order.

And it goes without saying but I'll make it clear on the record, that said, Defendants' motion for leave to narrow

their invalidity case is granted and we are going forward on the narrowed invalidity case with the obviousness combinations or presentations that Defendant has mentioned during both voir dire and opening statement.

All right. That's the Court's order on that.

Plaintiff, are you prepared to call your next witness?

MS. GRIFFITH: Yes, Your Honor.

THE COURT: All right. Let's bring in the jury, please, Mr. Turner.

(Whereupon, the jury entered the courtroom.)

THE COURT: Good morning, ladies and gentlemen. Welcome back. Please have a seat.

We'll continue with the Plaintiff's case in chief.

Plaintiff, call your next witness.

MS. GRIFFITH: Your Honor, Plaintiff Finesse calls Dr. Jonathan Wells.

THE COURT: All right. Doctor Wells, if you'll come forward and be sworn, please.

(Whereupon, the oath was administered by the Clerk.)

THE COURT: Please have a seat on the witness stand.

MS. GRIFFITH: Your Honor, may I have a moment to pass out the slides and direct exhibits?

THE COURT: You may. While she's doing that, let's go off the record for a moment.

(Discussion off the record.)

THE COURT: All right. We're back on the record. Counsel, you may proceed with direct examination.

MS. GRIFFITH: Thank you, Your Honor.

JONATHAN WELLS, Ph.D., SWORN,

testified under oath as follows:

DIRECT EXAMINATION

By Ms. Griffith:

Q. Good morning.

A. Good morning.

Q. Would you please state your name for the jury?

A. Yes. Good morning. My name is Jonathan Wells.

Q. And, Doctor Wells, you and I have met before. Right?

A. Yes, we have.

MS. GRIFFITH: To the members of the jury, good morning. My name is Meg Griffith. I'm also counsel for Finesse along with the other attorneys at counsel's table.

Q. (BY MS. GRIFFITH) And, Doctor Wells, you have a Ph.D. Correct?

A. Yes, I do.

Q. What is your area of expertise?

A. My area of expertise is in wireless communications.

Q. And why are you appearing at trial today?

A. I was asked by Finesse to look at the patents at issue today and to form my own opinion as to whether the Nokia products that are used on AT&T's network infringe those

patents.
Q. And have you formed any opinions about whether AT&T infringes the asserted claims?
A. Yes, I have.
Q. What is your opinion?
A. So in my opinion, the Nokia products that are used on AT&T's network infringe the asserted patents.
Q. Doctor Wells, what do you do for a living?
A. I have my own consulting company.
Q. What is it called?
A. It's called AJIS Consulting.
Q. How long have you been running AJIS Consulting?
A. I've been running this about 15 years now.
Q. Does AJIS stand for anything?
A. Yes, yes, it does. It's actually the initials of my family. My wife of 25 years is Andrea. I'm Jonathan. I have two daughters, Isabella and Sophie. The initials together, AJIS. My company is AJIS Consulting.
Q. And what services do you provide through AJIS consulting?
A. So I work as a consultant in the wireless communications area. I do a lot of work on looking at patents, technical patents, about wireless communications.
I also help companies with wireless product strategies. I write reports about what's happening in the cellular -- in the wireless industry, the direction that the industry is

going. And I write and sell those reports.
Q. Could you provide some examples of companies that have hired you for your services?
A. Yes. I've worked for a number of large companies. I've worked for Apple, worked for Samsung, worked for Google, worked for Intel, Microsoft, LG. Those are some examples of companies I've worked for.
Q. And have you prepared a set of presentation slides to illustrate your testimony?
A. Yes, I have.
Q. Doctor Wells, what's on the screen now?
A. So this slide is a summary of my background, my resume, if you like.
Q. And I'm guessing from your accent, you aren't from East Texas.
A. No, no, I'm not. So I was born and brought up in England. I did my studying in the UK. As a young man, I traveled around the world. I've lived in a number of places. But I moved to the States in 1998, so I've been here for 25 years now.
Q. Could you briefly summarize your educational background?
A. Yes. So my background, I have a Bachelor of Science degree in physics from the University of Bath. That's physics with electronics. I have a Ph.D. in electronics as well, also from the University of Bath. I also an MBA degree.

Q. And when did you receive your Ph.D.?
A. That was 1991.
Q. What did you do after you received your Ph.D.?
A. So after my Ph.D., I continued my research at the University of Bath. I had a grant from the Science and Engineering Research Council in the UK. I had sponsorship from British Aerospace in the UK, and I've continued doing my research. I was working on satellite receivers.
And then after that research, I went out into industry in the early '90s. I spent a couple of years working in the satellite industry building satellite receivers. And then in the mid '90s, I started in this -- this -- what was a new field at the time, the cellular industry. Cell phones were starting to come around. I started working in the cellular space.
Q. And what kind of work did you do in the cellular space?
A. Well, I worked for a number of companies that was building what we call cellular infrastructure equipment. I started off actually being a hands-on engineer designing components, soldering, building equipment, designing equipment, and then I moved up more into the management and product leadership positions.
Q. And the products that you designed, were any of them used in the real world?
A. Yes, yes, many of them were. I've designed systems that

have been used in -- sold tens of thousands, even hundreds of thousands of units.

Q. Are you aware this case is about something called PIM?

A. I am, yes.

Q. Do you have experience working with real-world PIM?

A. I do, yes. I first came across PIM, it was probably about the mid 1990s. I was working for a company in New Zealand. We were building a cellular infrastructure in New Zealand, in the southern hemisphere.

And I came across a company -- I was asked to help a company called Del Tech. They made antennas, but they were particularly trying to design antennas that had varied low PIM properties, meaning that they tried to eliminate the causes of PIM in these antennas. And that was about around the mid 1990s.

Q. And aside from your research at the University of Bath, have you published in the field of wireless technologies?

A. Yes. I have. I have written a textbook about high data rate wireless communications. I've published about 40 papers academic papers, presentations. I've also appeared on national TV a couple of times as a telecommunications expert.

Q. Do you have any patents of your own?

A. I do, yes. I'm the named first inventor on two U.S. patents and a number of international patents.

Q. Are you a member of any professional organizations?

A. I am. Perhaps the most relevant to this case is called a group called the IEEE. It stands for the Institute of Electrical and Electronic Engineers. I was -- I've been a member since college, but I was elected a senior member back in 1999.

Q. What does it mean to be a senior member?

A. Well, they have several membership grades. To be elected a senior member, it shows that you have to have a certain amount of responsibility in the field and a certain standing. I've been a senior member for 25 years.

Q. Have you received any other awards for your wireless communications' experience?

A. Yes, I have. Perhaps the one I'm most proud of is what's listed here. That was the Santa Clara Valley section of IEEE. That's actually the Silicon Valley section. They are actually the largest section in the world. They awarded me their 2019 Outstanding Engineer of the Year award. I was very proud of that and humbled.

Q. What does the Outstanding Engineer award mean to you? What is it awarded for?

A. It was for a number of things. It was my contribution towards high data rate wireless. As I'm sure you are all well aware, the world is moving towards higher and higher and higher data rates now. But also for mentoring that I do for younger engineers.

Q. And so if you could summarize, Doctor Wells, about how many years of experience do you have in the field?
A. So I have 35 years of experience in wireless communications.
Q. Have you prepared a report for this case?
A. Yes, I have.
Q. Are you being paid for your work in this case?
A. I am, yes.
Q. What is your rate of compensation?
A. So I'm being paid at $700 an hour.
Q. Does how much you get paid depend on whether Finesse wins or loses?
A. No, it doesn't. I have no financial interest in this case at all.
MS. GRIFFITH: Your Honor, Finesse moves to qualify Doctor Wells as an expert in wireless communications.
THE COURT: Is there objection?
MR. NELSON: No objection, Your Honor.
THE COURT: Without objection, the Court will recognize this witness as an expert in those designated fields. Please continue.
Q. (BY MS. GRIFFITH) Doctor Wells, what is on the screen now?
A. So these are the two patents that are at issue in this case. I think you heard yesterday we referred to them by the

last two digits of their number, the '134 Patent and the '775 Patent.
Q. And what have you put on this slide?
A. So AT&T's network is being accused in this case. This is an illustration of their network as -- and the coverage across the U.S.
Q. How is AT&T's mobile network accused of infringing the '134 and '775 Patents?
A. AT&T's network use these Nokia radios that include functionality that's described in the patents at issue here.
Q. And what have you put on this slide for the jury?
A. So I've tried to show here at a high level how a cellular network approximately works and some of the terms that we're going to be using today.
On the left-hand side I've got a cell tower. These are the towers you see by the side of the freeway and in parks and places like that. At the top of the tower, there are a number of antennas, and those antennas transmit a signal down to the user device, perhaps our cell phone. I've shown that in blue. Sometimes we call that the downlink. And then the phone sends a signal back up to the antennas. We call that the uplink.
And then behind these antennas at the top of the base station are a number of radios. The term we use, the remote radio heads. Sometimes they're just called radios. But they are the equipment that's developed by Nokia in this case.

Q. And what were you asked to do concerning these radios in the network?
A. So these Nokia radios that are used in AT&T's network, I was asked to analyze them and look at them, but, in particular, a functionality that's inside those radios, and it's called the GROOT FPGA. GROOT is G-R-double O-T.
Q. What does FPGA stand for?
A. FPGA is an industry term. It means field programmable gate array. A field programmable gate array is essentially a chip, like a computer chip, that's programmed to perform certain functionality.
Q. And what does the word GROOT mean? Does that have an industry definition?
A. No, it doesn't. This is a Nokia term.
Q. And in evaluating the GROOT FPGA for infringement, what materials did you consider?
A. So I used a variety of materials that I've shown on this slide here. I looked at the patents themselves, the language in the patent, the file history. That's the back and forth between the inventor Mr. Smith and the Patent Office.
I looked at a number of documents, documents from AT&T, documents from Nokia, technical documents from Nokia, including technical specifications.
There's also a number of people that have been deposed in this case. I looked at the deposition testimony of those

witnesses.
Q. And how did you use all of these materials in your infringement analysis?
A. So I used all these materials to give myself an understanding of how the products operated so that I could then take that and compare it to the language in the claims and to form my own opinion as to whether there was infringement in this case.
Q. And in walking us through your opinions, Doctor Wells, what kind of evidence do you plan to show us?
A. So I'm going to show you evidence from AT&T documents, Nokia documents, some technical specifications as well.
Q. Do you plan to use source code in your explanation today?
A. No, I'm not.
Q. Have you reviewed any source code in this matter?
A. Yes, I have.
Q. When was that?
A. I reviewed the Nokia source code in August of this year.
Q. Did you cite the source code in your report?
A. Yes, I did.
Q. Did you find anything in the source code that gave you doubts about the rest of your infringement analysis?
A. No, I didn't.
Q. Are you an expert in reading and writing source code?
A. I have the ability to read source code, but I wouldn't

hold myself out as an expert.
Q. How did you determine which code to review and cite in your report?
A. So I worked with an engineer. There's a lot of source code. This engineer passed the source code down, he looked at it, he found the areas of source code that he thought I should take a look at. I then looked at that source code with him and determined what I should include in my report.
Q. Were you able to conclude without the source code whether there was infringement?
A. Yes, I was.
Q. And how did the review of the source code affect your analysis?
A. Well, I included it in my report because I wanted to make sure that -- my report's pretty extensive. It's almost 300 pages of analysis of these products. So I included it in there, but I'm not going to be talking about it today because there's sufficient evidence in the AT&T and Nokia documents, I believe, to show that there's infringement.
Q. And what was the conclusion of your infringement analysis?
A. So it's my opinion that for the '134 Patent and the '775 Patent, that the asserted claims are all met by the Nokia product so there's infringement of these patents.
Q. Are you aware that Defendants are also challenging

whether Finesse's patents are even valid?
A. I am aware, yes.
Q. Have you prepared any opinion on the validity of these two patents?
A. No, no, I haven't. I've only been asked to look at the matter of infringement, does the Nokia product practice, does it use what's in the patents itself. I haven't been asked to look at invalidity or validity.
Q. And if you can kind of give us a roadmap, what should we expect to hear in your presentation?
A. So it's Finesse's burden to show that these patents are infringed. And so I have to tell you about every single one of these claims, and I have to show you that every single one of these claims is met by the Nokia products.
There's a lot of claims here and there's quite a lot of words. So I have to go through the technical documents to show you where these -- this evidence is.
Q. Is it your understanding whether Defendants agree with you on whether any of the limitations are met?
A. Yes. My understanding is, is that the Defendants oppose every single one of these claims or challenge, I should say, every single one of these claims.
Q. And what field of technology is related to these claims?
A. So these are all -- these patents are and the claims in the patents are all about wireless communications and

specifically how you cancel this type of interference called PIM from the wireless communication system.

Q. What are wireless communications?

A. So at its most simplest, a wireless communication is a communication without wires. So you'll have some kind of transmitter with an antenna that sends a wave, a signal, to another antenna with a receiver. That's a wireless communication.

Q. And are there any other wireless signals besides what we use in cell phones?

A. Yes. The wireless signals are all around us, just about all -- well, not all, but a lot of consumer electronics use these wireless communications. I've put some of them up here on the screen. AM/FM radio, broadcast TV, they all use wireless communications. Cell phones, of course. But then there's things like WiFi, GPS, Bluetooth. These all use wireless communications.

Q. Is it important for your slide that you have all of these in exactly the same order here?

A. Yes. I've arranged them in this order because one way in which we categorize wireless communications is by a thing called frequency, which I've tried to draw across the bottom.

Q. What does frequency mean?

A. Well, what happens is a wireless signal moves across the air as a wave, much like a wave would move across the ocean.

It moves up and it moves down. It has peaks and it has troughs. And so if that up and down happens quite slowly, we say it has a low frequency. If it happens more frequently, then we say it has a higher frequency.
Q. And is there any sort of unit that the industry uses to measure that frequency?
A. Yes. So the unit we use is called a Hertz.
Q. And what does the Hertz mean for the measurement?
A. Well, a Hertz measures how frequent this wave goes up and down. So, for example, I've shown here on this illustration, say, a time period of one second. Now, the wave at the top in red moves up and down three times a second. That means it has a frequency of three Hertz.
The green one in the bottom moves up and down a lot more frequently. It actually moves up and down 12 times in that second. So we say that has a frequency of 12 Hertz.
Q. What is the frequency of something like cell phone waves?
A. Well, cell phone waves up and down very, very, very fast, millions of times a second. So we use the term megahertz. Megahertz means it moves a million times a second. And believe it or not, cell phones typically are around a thousand or 2,000 megahertz. We sometimes call that a gigahertz.
Q. So when I'm using my cell phone, how does my cell phone know which signals to look for in these frequencies?
A. So cell phones, like all these other services here, are

allocated specific frequencies that they're allowed to operate on. So each cell phone or each cell phone vendor has a -- not vendor, the carrier has a specific set of frequencies, a small band of frequencies, that they're allowed to operate on.

Q. Who decides what frequencies they're allowed to operate on?

A. So this is determined by the FCC, the Federal Communications Commission, and they are responsible for allocating all the spectrum, all the frequencies, all the bandwidths in the U.S. And this very, very busy chart here actually shows the allocation of frequencies in the U.S.

Every single one of those little squares or rectangles or colors are a different kind of service. You know, buried in here, we have the AM/FM radios, TV broadcasts, WiFi. But cellular is buried in there as well, the bands that we use for cellular communications.

Q. And what does this slide show?

A. So this shows one of those rows. It's actually from 300 megahertz to 3,000 megahertz, or 3 gigahertz. And within here are some other bands -- if you can press the next slide, please. Thank you. So these are some of the cellular bands that have been allocated that AT&T uses.

So these are these little slivers of frequencies that have been allocated by the FCC for AT&T to use on its cellular network.

Q. And so how does the concept of PIM relate to cell phone bands like 25 and 66?
A. Well, what happens at a high level, these bands here, the frequencies of these bands, are very close together. You can see that they're very close on top of one another, and they're quite slim. So what happens is if there's interference of any kind, if that interference falls on top of one of these bands, then it can interfere with that operation of that equipment. And that's when we can start having problems.
Q. What kind of problems will we see on a cell phone?
A. Well, these problems where interference causes your phone to perhaps its bandwidth to be reduced, which means you're downloading something and it happens a lot slower, or it could even mean that something like a call or a connection is dropped.
Q. And how do the '134 and '775 Patents relate to interference?
A. So they relate to this particular kind of interference called PIM and how we can actually cancel out that interference so that we can avoid that interference falling on top of one of these bands.
Q. And what is PIM?
A. So PIM stands for passive intermodulation. It's a -- it's a frequency -- an unwanted frequency that occurs as a result of other frequencies that are in the system.

Q. And in preparing your infringement analysis on PIM, did you consider any documents from Nokia or AT&T that discussed the sources of PIM in cellular networks?
A. Yes, I did.
Q. Were any of those materials designated confidential?
A. I believe they were, yes.
MS. GRIFFITH: Your Honor, Finesse believes the courtroom must be sealed at this point because I'll be asking Doctor Wells about Nokia's confidential specs and source code.
THE COURT: All right. Based on counsel's request and to protect confidential information -- yes, Mr. Nelson?
MR. NELSON: Your Honor, and I thought we had worked this out, but we've been through the slides, and without the source code being presented, I don't have a problem and we don't need to go through the -- the exercise of sealing the courtroom, Your Honor.
THE COURT: In light of that, what's your request, Ms. Griffith?
MS. GRIFFITH: Oh, they are Nokia's designated documents. So if they don't need the courtroom sealed, we can proceed.
THE COURT: All right. Then let's proceed with the courtroom unsealed and open. That's always my preference.
Q. (BY MS. GRIFFITH) And, Doctor Wells, what is showing on the screen now?

A. So this is an excerpt from a Nokia document. It's Exhibit PX 855. You can see the front page on the left-hand side with the Nokia logo at the top. And I've highlighted -- I've taken a section from this document, and I've highlighted in yellow how Nokia characterizes PIM.
Q. And how does Nokia's document say that PIM affects a cellular network?
A. So if we look at the first sentence here, it talks about a multi-carrier FDD system. That's a frequency division duplex. That's a system, a cellular system, carrying TX and RX traffic, that's transmitter and receiver traffic, via a common antenna, has a reasonable probability of suffering from receiver desensitization by its own transmitter's cross-talk caused due to non-linearity of both active and passive elements. That non-linearity of passive elements is the PIM, the PIM intermodulation that we've been talking about.
Q. And what does RX desensitization mean?
A. That means that there's desensitization in a receiver. So if you have a receiver and it's receiving a signal and it becomes desensitized, it can't hear as well. An analogy would be, for example, I'm listening to you talking, but as I get older, my ears start to fade, my ears desense, and I can no longer hear, and so communication starts to be dropped and gets lost.
Q. And then in this document, how does Nokia describe the

probability that PIM may occur?
A. So that's in the second sentence here. It says, it's to be noted that the probability depends on the carrier configuration, in other words, what frequencies are being used; the band spacing between uplink and downlink, again what frequencies are being used; and the power rating of the carrier. And then it means that the products are -- and products that are improbable to suffer do not need IM cancellation, meaning that those that do have the wrong frequencies or something like that suffer from this intermodulation problem.
Q. And what kind of components can cause PIM to happen in these radios?
A. So that's in the second paragraph here. So as Nokia characterizes it, these passive intermodulation, they are PIM products. They are generated from the antenna works of the duplexer in the BTS--that's the base station--through connectors, jumper cables, feeder cables, site equipment, and antennas all the way up to and including the antennas.
What that means is you have a radio system that has a transmitter and a receiver. But beyond those transmitter and receiver, as I'll show you in a minute, you have a number of other mechanical components--filters, cables, connectors, antennas. These are the passive -- these are the components that I've listed here that cause this PIM interference.

Q. And how does this document propose addressing the PIM interference?
A. So this document says that the PIM interference can be addressed through cancellation.
Q. And how does PIM cancellation relate to this case generally?
A. So that's what this case is about. This case is about how PIM interference can be canceled in a radio equipment.
Q. At the time Mr. Smith filed the first provisional application that led to the '134 in 2001, were there any solutions before PIM cancellation from mitigating PIM?
A. Yes, there were.
Q. And what kind of solutions were those?
A. So we touched a little bit on these yesterday or I believe Mr. Smith touched on this yesterday. There's really three approaches that were around at the time as a way to address PIM. The first one was called frequency planning, the second one is called site hygiene, and the third one is filters.
Q. And what is frequency planning?
A. So frequency planning is the technique where you specifically try and choose the frequencies that you operate on to make sure that this PIM interference that results doesn't fall on one of these receiver bands and desense it.
Q. Well, why wouldn't frequency planning just continue to

work?

A. Well, it does work to an extent, but you're very limited in how you can apply frequency planning. And the reason for that is you only have these tiny little slivers of frequencies available to you and you've paid a lot of money for those, they are very valuable to you, but you don't really have much scope to use anything else. So you're kind of stuck with what you've got.

So if you've got frequencies where PIM is naturally going to be occurring, you really don't have much scope for doing any frequency planning.

Q. Okay. So we've heard a bit about site hygiene. What is that?

A. So site hygiene is really keeping the site clean. It's going up to the top of a tower and making sure that these components that cause PIM like I talked about--connectors, cables, antennas--to make sure that they're operating as best they can be.

Q. So why can't a company like AT&T or Verizon rely solely on site hygiene to fix PIM?

A. So there's a -- there's a couple of reasons. The first reason is that if you're in one of these situations where PIM is occurring, no amount of site hygiene cures the PIM. The PIM is just there. You can have gold-plated connectors everywhere, and you're still going to get PIM.

If you're in a site where perhaps the PIM is not such a problem, but you've got these cables get loose, you can go and tighten them up which would temporarily solve the problem. But like any hygiene, I mean, like personal hygiene, I can go and get a shower, but a week later again I need another shower.

So you have to go back to these sites regularly because wind sways towers, it loses connectors, things rust, things get old.

Q. So can AT&T just send up a technician to fix the radio whenever it deteriorates each week?

A. They can't do that. It's -- this is not a matter of sending a junior tech out of the office for half an hour. I've actually been to a number of wireless sites so I've helped in installing wireless equipment. And I know that to put equipment up a tower, you have to -- well, first of all, it all has to be scheduled and planned.

You need to do what's called a truck roll. And a truck roll is an expensive thing to do. You have to physically send a truck out to this place. You have to send a qualified engineer technician up the tower. That tower [sic] has to be qualified in climbing. He has to have a massive insurance policy on top of him because he's doing something pretty dangerous.

Occupational health and safety, he has to have a crew on

the ground in case there's an accident as well. And then he has to go up this tower with all this safety equipment to actually tighten up and repair all these things.

This is not an insignificant undertaking.

Q. So let's move to the last one. How does filtering work?

A. Well, filtering can be used when this PIM interference is not right on top of the band of the receiver. If it's some way off, then you can put a filter in there which sort of grabs the interference, the harmful interference, if you like.

Q. So why wouldn't that work to take care of PIM all the time?

A. I think Mr. Smith talked a little bit about this yesterday. The problem with the filtering is that it grabs everything. It grabs the bad, but it also grabs the good. So you can find that these filters can actually cause desensitization of the system by themselves.

Q. And how are these three approaches different from the Finesse patents' approach?

A. Well, I think the earlier approaches, they were all ways to try and stop PIM occurring. I think the interesting thing about these patents is the patents kind of accept that PIM occurs. They said, you know, this is -- you're going to suffer from PIM.

So what it does is it comes up with a way in which it can model what that PIM interference is and it can then cancel out

that interference. So it says, PIM is going to happen, but here's a way we can cancel that interference so it doesn't cause us a problem.

Q. And what does it mean to cancel out a signal?

A. So canceling out means something -- well, I've tried to show it how it would be on a slide here. And this is an example, noise canceling headphones. And what I've tried to show on the left-hand side, I've said, okay, let's imagine that you're in some environment and there's this external noise. That's this red wave here. Remember the signals travel as waves.

So if I can understand what that red noise is, I could somehow come up with a model of that noise. And that's the blue noise there, and I've called it anti noise. So it's the same noise. If I can model it, then what I do is I can put the two on top of one another and I can subtract that anti noise from the noise which means it's quiet.

Another way perhaps to think about this is I have a joint bank account with my wife. If I put $20 into my bank account and my wife takes $20 out of the bank account, her withdrawal has canceled out my deposit. We're left with the same level.

Q. And how is what we see on the slide here related to what the Finesse patents do?

A. Well, this is really an illustration of sort of what they do. What the Finesse patents do is they build a model of the

PIM interference and then they subtract that from the actual occurring PIM interference to remove it from the system.
Q. And if we look at the '134 Patent, which part of this patent did you look at to determine whether the '134 Patent was infringed?
A. Well, what's important as part of the analysis that I do is it's the claims of the patent which come at the end of the patent.
Q. And if the jurors opened their notebooks to the '134 Patent that's in there, how would they know which page to look at to start with the claims?
A. Okay. So the claims are at the end. But perhaps if I could explain this slide a little bit, this is showing you really what a patent really looks like, what it consists of.
So I've taken the '134 as an example, but this is the same with any patent. You have the front page, and the front page has information about the patent itself. It will have the title, it will have the inventor, it has a number of dates on it that are important that show when the patent was filed, and there's what's called an abstract which is a summary of the inventions or of the patent.
You then have a number of figures. So these are drawings that describe what's in the invention. And then you have a specification, and that's a written description of what's in the patent, a written description of the inventions, and it

covers what's in those figures as well.

But then at the very end we have what's most important, I think, in a patent is what's called the claims, and I think you probably heard this from the presentations that you've seen. It's the claims that define the invention, and those are numbered claims at the very end of the patent.

Q. And so in the '134 Patent, for example, do those start where there's a 28 at the top of the page?

A. Yes. So on the '134, they are on the 28th -- we number every column. You can see that every column has a number and then there are line numbers as well. So we talk about columns and line numbers to allow us to get to the areas we want.

Q. And how did you understand what technical terms in the claims meant for your infringement analysis?

A. So there's often in these patents some quite technical terms. So for some of the more technical terms, we rely on His Honor here. Judge Gilstrap has given us instructions as to what those particular terms mean. He provides what we call a construction for some of the terms in the patent.

Q. And what did you do for the claim terms that the Court did not define?

A. So for the other terms, the standard that I have to use is I have to apply what's called a plain and ordinary meaning to somebody of ordinary skill in the art.

Q. And for the '134 and '775 Patents, what in your opinion

makes someone an ordinary -- of ordinary skill in the art?

A. So a patent has to be written for somebody who has an understanding of what the patent is about, but it doesn't need to be a professor. So the person of ordinary skill in the art, in my opinion, for these patents would be somebody with a Bachelor of Science in electrical engineering or some sort of equivalent technical degree, and three or more years of experience in the design of wireless communications equipment.

And then I also note that there are some people with more qualifications or more experience that would also be a person of ordinary skill.

Q. So does that mean somebody who didn't have a Bachelor of Science but had more experience could still be a person of ordinary skill in the art?

A. Yes. So for example, you know, I recognize that somebody who perhaps doesn't have a degree but has maybe a lot more experience of designing wireless equipment would be able to understand these terms.

Q. And, Doctor Wells, based on that standard, are you a person of ordinary skill in the art?

A. Yes, I am. So the relevant date for this is back when the patents were filed, which is the early 2000s. So, yes, I had a Ph.D. and I had 10 years of experience at that time.

Q. And which three claims of the '134 Patent did you analyze?

A. So for the '134 Patent, there's three claims that are being asserted, and I analyzed claim 1, claim 2, and claim 3.
Q. And in your opinion does AT&T infringe those claims?
A. That is my opinion, yes.
Q. What is showing on the screen now?
A. So this is the abstract from the '134 Patent. It's on the very front page. And I've highlighted a couple of things here just to show what the '134 Patent is about at a high level.
You can see the very first sentence there, various apparatuses and methods are described to "reduce interference in signals subject to intermodulation." And then it says that, the very last sentence, the way in which that's done is that the isolated interfering signals are then "canceled out of the signal of interest."
So the '134 Patent is about canceling out intermodulation products.
Q. Is there abstract itself part of your infringement analysis?
A. No, no, it's not. I mean, this provides -- well, I mean it provides an overview of what the patent is about.
Q. And what is showing on this slide?
A. So this is actually showing claim 1 of the patent. As I said earlier, there's a lot of words there, there's a lot of technical terms, but I'm going to try and run through this and

show you what this all means.
Q. So is what's on the slide here the same thing as what's in column 28 of the '134?
A. Yes.
Q. And is there a primary category of evidence you relied on in looking at this claim?
A. Yes. So I relied on primarily the Nokia technical documents and technical specifications to show that the Nokia products meet this limitation, this claim.
Q. And looking at Nokia documents, what is on this slide at Exhibit 918?
A. So this slide is a Nokia presentation. You can see the Nokia emblem in the top left.
Q. And can you remind us, what does FPGA stand for?
A. FPGA stands for field programmable gate array. Remember this is that chip, it's like a computer chip, that can be programmed to perform certain functionalities.
Q. And on the next slide, still in PX 918 but it looks like Bates stamp 21689, so that page, what is on this page?
A. So this page gives a little bit of background as to what this functionality called GROOT is about. GROOT is what I'm going to be talking about primarily today.
Q. And what's the difference between GROOT and Galaxy?
A. So you can see at the top that they're the same thing. The GROOT FPGA, it's formerly known as the Galaxy FPGA. Some

of the documents that I refer to call it GROOT, some of the documents I refer to call it Galaxy. They are the same thing.

Q. And what does GROOT stand for?

A. So you can see that if you look through this document, they've said that the name Galaxy is a bit boring so they came up with a more catchy algorithm for it, which is GROOT. GROOT is an acronym which stands for getting rid of offending tones. So the intermodulation, that's a -- that's a tone, it's an offending tone because it can cause desensitization of these receivers. So what GROOT does is it gets rid of offending tones. It gets rid of this PIM interference.

Q. And we talked about AT&T's network before, and what part did you analyze for infringement?

A. So AT&T on there, the network across the U.S. they use these Nokia radios, these radio heads, on the right-hand side are the products being accused. They are given the names AHFIB, AHLBA, and AHLBBA. They are Nokia radios. But inside all of those radios, they have this GROOT FPGA.

Q. So do you have a separate infringement analysis for each of these three radios?

A. No, no, I don't. So my analysis is the same for all of them. And the reason that it's the same for all of them is I looked at this GROOT FPGA and how that functions, and that GROOT FPGA is used in all three of these radios.

Q. And do you see PX 832, PX 855, PX 839, and PX 858 on this

slide?
A. Yes, I do.
Q. What are these four documents?
A. So these four documents are all Nokia technical specifications that describe how the GROOT, and you can see sometimes it's called Galaxy, but how the GROOT FPGA is architected, how it's put together, and how it functions.
Q. And are these documents you were able to find on the internet?
A. No, I wasn't, no.
Q. Who produced them?
A. So these have all been produced by counsel for AT&T or Nokia, Defendants' counsel in this case.
Q. And, Doctor Wells, what is highlighted on this slide?
A. So this is the very first part of the patent. It's called a preamble, and that says that claim 1 is a method.
Q. And what does it mean if GROOT has to have a method?
A. So a method is really a process, a procedure, the steps of a procedure that you have to step through. So it says, is GROOT a -- a method.
Q. And do you see page 722 of Exhibit 839 on your screen?
A. Yes, I do.
Q. What does this page show?
A. So this is the summary from Nokia's document here that describes what GROOT actually is. It says that GROOT's

primary requirement is to perform passive intermodulation or PIM distortion cancellation. That's what the patents are about.
Q. And in that second to last line on this slide that's highlighted, what does it mean to remove it from the RX data?
A. Yeah. So that says that the GROOT cancels the passive intermodulation distortion, so that's the cancellation we talked about earlier, thus removing it from the RX data.
Rx is the nomenclature we use in electronics for receiver. So that's saying that it removes the passive intermodulation distortion, this PIM, from the receive data.
Q. And on the next slide, do you see where in PX 855 and at the bottom it says figure 1? Do you see that?
A. Yes, I do.
Q. What does figure 1 show?
A. So this is an architectural diagram of how GROOT operates. You can see that at the top of the slide where it says the Title III, underneath that it says, figure 1 shows the behavioral function architecture of PIM-C implementation. PIM-C stands for PIM cancellation.
Q. And what does the top part of this diagram show?
A. So this diagram shows a radio product. What is shown in yellow across the top is the transmitter chain of this product. So remember a wireless equipment has a transmitter that will actually generate that wireless signal that's sent

over the air. This is the transmitter.

Q. And which part of this transmitter, if you can show us, has the antenna?

A. Okay. So the transmitter, we know this is a transmitter because, first of all, a person of skill would understand what these abbreviations are and understand they apply to a transmitter. But the signal will move from here in a transmit fashion until it comes up to this thing here which is actually the antenna.

You can -- well, maybe you can't see, but it's very small there, it's written as an antenna, but that is the -- that's the symbol that we use in electronics for an antenna.

Q. And what does the label PIM sources mean in that dashed box around the antenna?

A. So in that dashed box on the top right-hand side, it says -- I don't know if you can see it, but I'll read it. It says PIM sources. So these are the sources of that PIM interference.

Thank you. Thank you, Mr. Boles.

So it says the TX duplexer, that's the transmitter filter, the antenna connector, cable, interface cable, the antenna. These are the things that cause PIM interference.

Q. And what does that red dashed line coming down represent?

A. So what this is showing is it's showing that from this transmitter, here we have what's called a coupler, and this

coupler takes some of that signal and it passes it back, it feeds it back here into what is the -- you can see GROOT FPGA. This is the GROOT FPGA.

Q. Would you mind pushing the microphone a bit forward so we can still hear you?

A. I'm sorry, yes.

Q. No, it's fine. Thank you.

A. So your question was, what is the red path. So the red path is the feedback that goes back into the GROOT FPGA.

Q. And what it says on the bottom right, there's a brown path. It's a little hard to see color on this screen. Can you show us where the brown path is?

A. Yes. These colors actually were in the original document. I didn't add these colors. So the brown path, which you can see, is labeled here. The brown path is actually this path from the antenna that comes down here and then it comes through here. So that's the actual, what we call, the uplink receive part.

This is the path that's received from the cell phone that comes back up to the base station, and it has the actual PIM path, meaning that it actually has the PIM interference already superimposed on it. So that's the signal that's got the interference on it. So you're receiving the PIM interference.

Q. And in the legend at the bottom right, it says, red dash

DL(TX) reference. Do you see that?
A. Yes, I do.
Q. What does DL(TX) reference mean?
A. So that stands for downlink transmitter reference, and that's because that red path is a copy of the transmit signal that is being fed back into this receiver.
Q. So why would it be helpful to receive a signal that was transmitted from the same radio?
A. Because what GROOT does is it takes that transmit signal and from that transmit signal that it will generate a model of the PIM interference that it then uses to cancel out the received interference.
Q. And what happens when the red path goes into the GROOT box in the middle?
A. Yeah. So this reference comes back here, it comes into the GROOT FPGA, and then the GROOT FPGA generates a model of what that interference is going to look like.
Q. And then what does the GROOT FPGA do after it makes that model?
A. So after it makes that model, it applies it to this component here. And I've just drawn over the top of it, but there's a very small minus sign in there. I'll show you some more details about that a little bit later. That's the -- that's where the cancellation happens.
There's a subtractor. And so what it does is it

subtracts this PIM model from the uplink signal that contains the PIM interference and by -- remember like that example, I've added $20 into my account, my wife subtracts $20 out to cancel it all out, this subtractor in the middle cancels out the model from the actual signal to leave us with this green path which is the desired uplink. It's the clean uplink path. So the interference has been canceled out.
Q. And so if we go back to the preamble, is the preamble satisfied by GROOT?
A. Yes. A GROOT is a method. It's a procedure.
Q. So can I put a green checkmark next to this?
A. Yes, you can. So what I'm doing here is I'm putting a green checkmark to say GROOT meets this limitation. GROOT practices this requirement.
Q. And can we move on to the next limitation, if you don't mind?
A. Yes.
Q. What does that first word, oversampling, mean?
A. So oversampling is a word that's commonly used in the industry, and it means to -- well, it means to oversample. Let me try and explain what that means.
We use the term sampling to -- in signal processing to mean taking a snapshot of a signal, almost like a photograph of the signal, what is the signal doing at an instant in time. And then what we do is we use a number of those samples to be

able to understand how a signal actually changes and moves.

So an example would be, if we can go to the next one here, this is just a picture of a gymnast doing a little bit of acrobatics. And this is sampled three times. We can see three pictures here. Now, we've got a pretty good idea of what this gymnast is doing, but we're not entirely sure. I mean, it looks like she's doing a cartwheel, but maybe she's doing a handstand. We're not quite sure.

So what we do in electronics we do what we call oversampling.

And oversampling is the next slide, please.

And what this means is we take enough snapshots so that we have -- we are able to really fully understand in this case what the gymnast is doing. From an electronics perspective, we take enough samples, enough snapshots, so that we've got a good understanding of how the signal is operating.

Q. And what is oversampling used for in wireless communications?

A. Well, we oversample -- it's a technique that we use, it's a common technique, to when we actually take analog signal, so that's that wave that I talked about, to be able to process it and to do computer processing on it, we have to turn it into a digital signal, into bits of information.

So we have what's called a digital -- I beg your pardon, an analog-to-digital converter. It converts the wave into a

series of bits. And the number of bits that we have is the sample. And we take an oversample of that, meaning we take enough bits that we can really understand what the wave form is looking like.

Q. And do you see figure 1 is back on the screen?

A. Yes, I do.

Q. Where does the GROOT diagram show oversampling?

A. So this oversampling is being done in this component here. It's called an RF ADC that stands for radio frequency analog to digital converter.

Q. And how do you know that this analog-to-digital converter is oversampling and not just sampling?

A. So we know that if we are able to zoom in to the actual circuit diagram to see how this actually performs.

Q. Is this the circuit diagram you mean?

A. Yes, it is.

Q. I see it's labeled figure 2 from Exhibit 855. Is this the same document?

A. Yes, this is the same document. This is the next figure from that document.

Q. And what do the red dashed lines in this diagram mean?

A. So, again, these red dashed lines were already there in the document, but I'd like to zoom into the red block in the middle and we can actually see what is going on with that RF ADC.

Thank you.

Q. And how do you see the oversampling happening in this more detailed diagram?

A. Right. So I know this is a sort of a technical diagram, but what this is showing here, you can see in the middle of the screen there's those white squares. At the top of them, it says dual RF ADC single DDC. So that's the RF ADC on that previous slide.

And what happens is the signals, those red signals that we talked about before, are coming in here. They are going through these first blocks, these almost like -- they look like staples, if you like, they are what we called band pass filters. They only let a certain number of frequencies through.

And then it goes into the analog-to-digital converter, which is here. So we have an analog signal coming in from the right, we have a digital signal, a bit stream, coming out on the left, and this document tells us that that bit stream is at 245.76 mega samples per second, meaning it's 245 million samples a second.

Q. And how do you know that that number means that there is oversampling?

A. So the definition that's accepted in electronics is that that -- for there to be oversampling, that sample rate has to be twice the bandwidth of the incoming signals.

So if I can put up the next slide, these are the bandwidths of those filters, those sort of these staple like things here. These are the bandwidths of those for the different bands. You can see they go from 17 megahertz to 70 megahertz. And in every case, that 245 is more than twice the bandwidth of those filters of the incoming signal, which means that technically there's this -- this is being not just sampled, it's being oversampled.

Q. So do you mean like 70 times 2?

A. Yeah. So 70 -- taking the worst case, 70 times 2 is 140. 245 is more than twice 70; therefore, technically this is oversampled rather than just sampled.

Q. And here there is in blue, it says B28/20 or B8. Where do the bands 12, 14, and so on come into this diagram?

A. These are the -- the bands at the bottom are the bands that AT&T uses in the U.S.

Q. Okay. So is this diagram specifically for those radios?

A. No. I think this is a -- it has those labels, but it applies to all the different bands that can be used.

Q. And then do you see where the claim language says, at a desired frequency, at the top of the screen?

A. Yes, I do.

Q. How do you know that there's oversampling at a desired frequency?

A. So there's oversampling at a desired frequency because

each of these bands, as I showed you, remember, on that FCC slot and all the different bands that come out of it, those slivers, those are at a specific frequency, at a desired frequency.

Q. Okay. So is that the B28 here?

A. Yes.

Q. Okay. And then what makes it a passband of received signals?

A. It's a passband of received signals because this staple-like thing that I've highlighted in red is a band pass filter. So there's a band pass of received signals, and we know it creates a bit stream because the output at 245 mega samples a second is a digital stream of bits. It's a bit stream.

Q. And then what about that last part I've highlighted at top where it says -- so it says, oversampling all the way to create a bit stream. So is all of that present here?

A. Yes, correct.

Q. And then do you see the next element that's underlined here?

A. Yes, I do.

Q. Has the Court construed anything in this claim?

A. Yes. They've construed a number of terms in this claim. But in that sentence that's highlighted in the title, the Court has said that there's a construction for the term signal

of interest, and the Court has said that that means with respect to the receiver, "a signal that the receiver is trying to receive and send, in digital form, to the base band processor."

Q. And what does it mean for your analysis if the Court has construed the term?

A. So that's the definition that I'm required to use.

Q. What if someone of ordinary skill in the art would think that it means something different? Could you use that instead?

A. No. The requirement that is placed on me is that, when His Honor provides us a construction, I have to use -- we all have to use that construction.

Q. And we're back at figure 1 from PX 855. What is the signal of interest in this diagram?

A. So the signal of interest in this diagram is in this red path here. The red path is labeled downlink TX reference and modeled PIM path. The downlink TX reference is the signal of interest.

Q. And what lets you know that this is being received, that there's a receiver taking in the signal of interest?

A. We know it's being received because, as I showed you earlier, we have this RF ADC that receives this signal and it converts it into a digital path.

Q. And the construction signal of interest, is that what is

at the bottom of left of the screen?
A. Yes, that's right.
Q. What about the last part there that says base band processor. Where is that?
A. Yeah. So the definition is on the bottom left. So we know that this is a signal that the receiver is trying to receive because it's received here. And it's sent in digital form, that's here. Remember this has been converted from an analog signal to a digital signal, it's being sent in digital form to the base band processor, which is the GROOT FPGA.
Q. But doesn't the legend at the bottom right say DL(TX) like transmit?
A. It does, yes. It says it's the DL(TX), the downlink transmit. But it also says that it's the reference. It's not the downlink transmit signal. It's a reference because it's being coupled -- this nomenclature here means a coupler. So it's being coupled off, it's being sniffed off. A sample of is being sniffed off, and it's being sent back to the receiver here.
So even though it's labeled downlink TX, it's actually with respect to the receiver a signal that the receiver is trying to receive. Therefore, it meets the Court's construction of a signal of interest.
Q. And do you see that in the highlighted part at the top, the last part says interference generating signals?

A. Yes, I do.

Q. Where is that to be found in this diagram?

A. So the interference generating signals are also within that red path. We know, and I'll show you slides later on that will show, that red path has two inputs.

Q. And do you see the last part that's highlighted now?

A. Yes, I do.

Q. What is the Court's construction of intermodulation products?

A. So an intermodulation product, the Court has told us that that means "the signal that results from mixing of jammer signals in the non-linearities of the system that result in generating interfering signals in the passband of the signal of interest. Wherein, jammer signal is any signal in the receive passband that is not the intended signal of interest."

Q. And is this in that list of terms in that table that's in the juror notebooks?

A. Yes, I believe it probably is. You probably have a table with all these construed terms.

Q. And looking back at figure 1 again, where are the jammer signals in GROOT?

A. Right. So we know that this red path has two signals in it. So the second signal is labeled here and the model PIM path would be that -- that jammer signal, and it's that that's causing the -- the signal is causing the intermodulation

products in band at the signal of interest.
Q. And so what is your overall conclusion for this limitation?
A. So because every one of these -- everything in this limitation is present in the GROOT product, then this is included in the product, the GROOT uses this requirement, so I've put a checkmark on the right-hand side.
Q. And the next limitation, do you see it starts with isolating signals of interest?
A. Yes.
Q. And at the end it says, decimating filters?
A. Yes.
Q. How has the Court construed decimating filter?
A. So this is the construction that the Court has provided us. It's "a filter associated with the Sigma Delta Modulator or any digital down sampling filter."
Q. Could you explain a little bit more for us what that means?
A. Yeah. I can try. So it's really saying a filter or this decimating filter can be one of two things. It can either be a filter associated with the Sigma Delta Modulator, or it can be any digital down sampling filter.
Now, GROOT actually has a digital down sampling filter, as I'm going to show you, so that digital down sampling filter meets the Court's construction of a decimating filter.

Q. And the first part of that limitation where it says isolating, what do you understand isolating to mean?
A. So I think -- so this is where I'd apply the plain and ordinary meaning as understood by a person of skill in the art. So I think isolating to a person of skill means to take something and to isolate it, to remove it.
So, for example, if I came down with the flu, I would try and isolate myself, I would put myself in a separate room, I would remove myself from the rest of the population. I'd isolate myself.
Q. And how does this relate to isolating a signal of interest?
A. Well, GROOT takes the signal of interest, it filters it out, and so it isolates it.
Q. And do you see -- this is from PX 839. What is this figure?
A. Yes. Again, I apologize, this is a very detailed figure. But what this is intended to show is it's intended to show inside the GROOT product, there is a thing called the PIM engine. You can see that in the title across the top, the PIM engine.
And the PIM engine essentially consists of three parts, and I've highlighted those with those yellow blocks. On the left-hand side, those blocks are called the pre-NL. That means the pre-non-linear block. In the middle, we have the

non-linear block. And then on the right-hand side, we have the post-NL, meaning the post-non-linear.

So this is really -- as a summary, it's saying that GROOT is a non-linear engine. It has a preblock, the non-linear block, and then a post block.

Q. And where in GROOT are the decimating filters?

A. So that's shown in this excerpt here from PX 855. It says, the post linear block consists of an RxFIR filter, so it consists of a filter, whose primary aim is to decimate the modeled signal. In other words, that's a decimating filter.

Q. And how do you know that the decimating filter is isolating the signals of interest?

A. Well, we know that from the second sentence because it says that this decimating filter is needed to LPF, that means to low pass filter, the desired intermodulation signals falling in the uplink band from the transmit carrier. The transmit carrier is what was shown in red on that previous slide there.

So it's saying that this decimating filter, it needs to low pass filter, it needs to take the desired intermodulations away from that red path. So it's saying it takes it, filters out, it isolates that red path. That red path contains the signals of interest.

Q. And in the end of that first sentence, it says UL signal sampling rate. What does that mean?

A. Oh, yes. So that's part of the -- that's confirming that the filter is actually doing decimating, because decimating is reducing the sampling rate and so it's changing the sampling rate to match the uplink signal.
Q. And in the limitation we're looking at in the middle at the top of the screen, it says in the bit stream. How do you know that this is all happening in the bit stream?
A. I know this is all in the bit stream because that is all happening in that digital signal processing. It is going on digital signals, so it's being done on a bit stream.
Q. And so what was your overall conclusion for this limitation?
A. So this requirement is present in GROOT, so I put a tick, a checkmark, on the right-hand side.
Q. And do you mind looking at the next limitation?
A. Of course.
Q. What are the -- we just discussed decimating filters in the context of isolating signals of interest. Does that same construction apply for this limitation?
A. For the decimating filter, yes.
Q. And then the Court construed source signals, which is in this limitation as well. Right?
A. Correct.
Q. What is the construction of source signals?
A. So the source signals are signals that mix in the

non-linearities to produce intermodulation products that fall in-band of the signal of interest.
Q. And if we look back at figure 1, where do you see the source signals coming in?
A. Well, we know that this red path, it includes the signals of interest, it includes the interference generating signals, which is also the source signals. So we know that comes in through the red path.
Q. And how do you know that these source signals are signals that mix in the non-linearities to produce intermodulation products?
A. Because that's what -- that's what causes these intermodulation products. It's the combination of the interference generating signal.
Q. And how do you know that it's making intermodulation products that fall in-band of the signal of interest?
A. Because that's what we're trying to cancel out. We're trying -- this causes the in-band intermodulations that we're trying to cancel out of the receive signal.
Q. And if we turn to page 1973 in PX 855, this is the same paragraph we're looking at for the prior limitation. Right?
A. It is, yes.
Q. Where do you see the source signal isolation described here?
A. So that's really, again, because, as I showed for the

previous one, that filter takes out that red path. It isolates that red path, and that red path contains the source signals, which was in the last limitation.

And the red path also contains the -- I beg your pardon, the signal of interest in the last limitation. But it also includes the source signals in this path. So that filter takes out both of those signals.

Q. And so what was your conclusion for this limitation?

A. So this limitation is also met, so we can put a checkmark.

Q. And do you see the next limitation talks about computing from the source signals?

A. Yes, I do.

Q. How does GROOT use the source signals as an input for the computations?

A. Right. So we know that the source signals are used as an input for the computation because the source signals are what comes in here. The red path comes in here. This prenon-linear thing has that -- well, they come in through the non-linear thing, they come into here into what we call the non-linear block. And this non-linear block is what performs the -- the intermodulation generation.

Q. And if we go to page -- to Exhibit 858 at page 2163, do you see it's figure 3 on the screen now?

A. Yes, I do.

Q. What are we looking at here with respect to this limitation?
A. So this is a blow-up, again, an engineering diagram, but it's of that non-linear block, what is in the middle of that GROOT FPGA.
Q. So is this the same thing as one of the parts on this screen?
A. Yes. So this is -- this section here, you maybe can't read it, but it's written in the middle 'NL block'. That's the non-linear block.
Thank you.
Q. Okay. And so that's what we're looking at here?
A. Yes. So this is a zoom-in, if you like, of what's the electronics within that non-linear block.
Q. And where do you see the source signals coming into this non-linear block?
A. So this is showing signals moving from the left-hand side to the right-hand side. There is -- on the left there's actually two inputs, X1 and X2. So this is that red path that contains two signals, and it comes into this non-linear block.
And what this non-linear block does is, you can see the sentence at the top, that it takes the transmit band signals and it's responsible to build the PIM model to be subtracted. So this is what actually builds that model that is then used to cancel out the PIM interference.

Q. So how does this track to the language in the limitation that says 'computing an estimate'?
A. So this computes an estimate, this builds the model, which are estimates of the intermodulation products that are then going to be canceled out.
Q. And so what was your overall conclusion for this limitation?
A. So this limitation is also present in GROOT, so we can put a green checkmark next to this.
Q. And if we look at the next limitation where it says 'canceling out', is this the same as the canceling out you were talking about before?
A. Yes, it is.
Q. And would you go back to figure 1 with me again?
Where in the diagram does GROOT perform cancellation?
A. So the cancellation is actually done in the GROOT FPGA, and you can see--thank you--that the blue arrow there is pointing to this component here. It's a little unclear to see, but there's a minus sign in there, so this is a subtraction. That's where the canceling out is done.
This is where that model is subtracted from the receive signal that contains the interference, thus canceling out the interference.
Q. And looking at the limitation language at the top of the screen, how do you know that the cancellation is using the

estimate of intermodulation products?

A. Well, we know it's using that because the block above that subtractor is called the PIM adaptive model. That's the non-linear or includes that non-linear block--we just looked at that--that generates the estimates of the intermodulation products.

Q. And how do you know that the canceling is canceling out in-band intermodulation products?

A. Because all these -- well, we know it's canceling out because this slide tells us that you're removing the path to get a clean path, and we know that they are intermodulation products because that's what we're canceling.

Q. And do you see page 753 of Exhibit 839 on the screen?

A. Yes, I do.

Q. How does this slide relate to the canceling out limitation?

A. So this is showing us in a little bit more detail how that canceler actually works. You can see it's called at the top the difference calculation. And it says -- the text said the difference calculation, this is the final calculation in the PIM engine. This is where the PIM modeled data is subtracted from the RX. That's the receive signal. And then the corrected signal is then passed on.

And we can see that in the figure, too. On the left-hand side are the two inputs. One of them is the non-linear model

out, so that's the output from that non-linear block that generates all the estimates. The other one is the RX input. That's the receive signal. And then you can see a big green subtractor in the middle. That's what subtracts one from the other.
Q. And so that ends up with the corrected RX out?
A. Correct.
Q. So what was your overall conclusion for this limitation?
A. Well, this limitation is also in the GROOT product, so I've put a green checkmark on the right-hand side.
Q. And we're moving on to the last limitation now. Right?
A. Yes.
Q. So this starts, do you see, where performing phase and amplitude adjustment on estimations of the intermodulation product interfering signals? Do you see that first part?
A. Yes, I do.
Q. And do you see -- well, what have you put on this slide here?
A. So this is a figure from the '134 Patent. This is actually figure 11 from the patent.
Q. And what does this figure show?
A. This is showing us what the patent intended by a phase adjustment. What this is showing is this is showing that wave I talked about before. Everything is done in waves. And in rather small letters across the very top, it says that this is

the objective phase shift.

And what this is saying is the phase of that wave, where it moves up and down, is actually shifted, and you can see that the shift between these two is effectively a delay between the two. You can see that the bottom wave there is just -- or I guess actually the top wave is actually just delayed a little bit for the bottom.

So the two are shifted a little bit in time, that's a delay, but that's what a phase change is.

Q. And what have you put on this slide?

A. So this is just another figure to show what a phase change is. So a phase change is the relative movement between two of these waves. In this case here you can see that there's a phase change between the two and that shows itself as a delay. A phase change is synonymous with a delay.

Q. And in that highlighted part at the top, it says 'amplitude adjustment'. What does amplitude adjustment mean?

A. Yeah. So amplitude adjustment means you adjust the height of the wave. If the wave is a small wave on a calm day on an ocean, we say that has a low amplitude. If it's a rough day and we've got big waves like this, we say that that's a high amplitude.

Q. And do you see page 408 from Exhibit 832 on the screen?

A. Yes, I do.

Q. Does GROOT include phase and amplitude adjustment?

A. Yes, yes. We know it does because this paragraph here, this snapshot that I've taken, it talks about how the GROOT is used to generate the non-linear products. That's those intermodulation products we talked about. They are correlated, blah, blah, blah, and then there is delay adjust -- they are delay adjusted and amplitude adjusted. So this is saying that GROOT performs the amplitude and phase adjustment.
Q. And if we go back to figure 3 from Exhibit 858, where does the amplitude adjustment occur?
A. So in this figure here, the non-linear block, the estimation is being performed by all these functions on the right-hand side. Every one of those has a red block above it. Again, these colors, not the yellow but the red there, was in the original document. I've just highlighted them in yellow. Each one of those is a coefficient that's added to that path, and that coefficient is an amplitude adjustment.
Q. How does GROOT know what number to put in for each of the coefficients in the red boxes?
A. Yes. So there's a -- there's actually 19 of those coefficients here. They go from A0 to A18. GROOT knows those because there's a function called a correlator, and that correlator generates these coefficients.
Q. And looking at Exhibit 839 at page 752, where does GROOT apply the delay adjustments?
A. So the delay adjustments are done in this function here

called a delay block. This is used to account for the different delays that are used.

Q. And where do you see the delay happening on this slide?

A. Well, this shows that you have the -- you have a -- what's called a shift register delay block, and we know that it does a delay of 5 [sic] to 514 samples. Remember, this is being sampled in the bit stream, so it puts a delay of samples, which is equivalent to about 1, and that sign there means a microsecond.

Q. And if we go back to the limitation language, you've underlined 'sub-sample phase shifts' here. What are sub-sample phase shifts?

A. So what this part of the claim means, it is what we call a wherein clause, and it says, Wherein, that phase adjustment is done on what it calls sub-sample phase shifts. So what a sub-sample phase shift is, the patent tells us that you have these -- everything's going at a sample rate. You then have this decimating filter whose job it is to reduce the sampling. That's what decimating means--reduce the sampling. And then you perform the phase shift.

So a sub-sample phase shift means that you perform that phase shift after everything has been reduced in sampling which is after that decimating filter.

Q. So are there sub-sample phase shifts in the GROOT process?

A. Yes, there are, because that delay that we looked at, which is at the end after the filter, which is the decimating filter, so the phase shifts are being done on a sub-sampled basis.
Q. And then do you see the last element that we haven't talked about in this long limitation is 'closed loop manner'? Do you see that?
A. Yes, I do.
Q. Is 'closed loop manner' defined by the Court?
A. No, it's not.
Q. Is it defined in the patent?
A. No, it's not.
Q. How did you know what the term meant in doing your analysis?
A. So we have to apply the plain and ordinary meaning of what a closed loop manner would mean to a person of ordinary skill in the art.
Q. And what would that be?
A. Well, a closed loop is really where you take some sort of signal or something and you try and hold it at a certain value, and then this is in a closed loop manner, meaning that it has to be like that.
Q. And if we go to Exhibit 855 at page 1979, where is the adjustment happening in a closed loop manner in GROOT?
A. So GROOT has this functionality called delay search, and

what this -- and there's two parts of it called a wide delay search and a narrow delay search. And you can see I've highlighted a few things here from this PX 855. It says that the wide delay search, it helps in finding out the initial delay search/time alignment between the actual PIM signal and the modeled PIM signal. So what this is doing is it's adjusting that modeled signal relative to the receive signal.

And then it says -- the next highlighted thing is until the PIM source is found, there is a need to run this routine frequently. In other words, this has to be run continuously again and again and again.

And then at the very last thing, it talks about how this needs to be run every time PIM estimation is done after the PIM source is found; again, meaning it has to be run again and again.

And then just above that it also talks about how this helps in tracking the delay, meaning that once the delay is there, it tracks it, it has to follow it in some way.

Q. And so what was your conclusion as to the whole of this limitation?

A. Well, that's the evidence that there's a closed loop manner going on, but the overall conclusion with this limitation is this is also met by GROOT. So I can put a green checkmark on the right-hand side.

Q. And so what was your overall conclusion for this whole

claim?
A. All right. So because every single one of these requirements is met by the Nokia product, then there is infringement of claim 1.
Q. Can I check it off?
A. Yes, you can put a check next to claim 1.
Q. And so what is showing on the screen now?
THE COURT: Before we get to claim 2, we're going to take a short recess. This seems like a good opportunity to do that.
Ladies and gentlemen of the jury, you may simply just close your notebooks and leave them in your chairs. During recess please follow all my instructions, including not discussing the case with each other. And take this opportunity to stretch your legs, get a drink of water.
We will be back with the remainder of claim 2 and this testimony.
The jury's excused for recess.
(Whereupon, the jury left the courtroom.)
THE COURT: The Court stands in recess.
(Brief Recess.)
THE COURT: Be seated, please.
All right. Let's bring in the jury.
(Whereupon, the jury entered the courtroom.)
THE COURT: Please be seated.

All right, Ms. Griffith. You may continue with direct examination of the witness.

MS. GRIFFITH: Thank you, Your Honor.

Q. (BY MS. GRIFFITH) Doctor Wells, what is on the screen right now?

A. So this is the second claim of the '134 Patent. This is claim 2.

Q. And would you please compare claims 1 and 2 for the jury?

A. Yes, I can. So in this slide here, what I've done is I've put the two claims alongside one another and everything in green is common between the two except for a couple of key differences which I'd like to explain.

So the differences here are what is in red. Now, claim 1, remember I said it was a method claim? It talks about a procedure that you have to go to -- go through. Claim 2 is what we call an apparatus claim. You can see that at the top.

So claim 2 is different in that it claims an apparatus, a piece of equipment, a unit, if you like, that that piece of equipment has -- that performs the method of claim 1. So it's different because it's pointing to something different, but you can see that all the language is the same down the middle.

Q. And so, Doctor Wells, do you intend to address in detail what's in green?

A. No, I'm not going to address everything that's in claim 2 because I've already talked about that for claim 1, so I don't

need to repeat it.
Q. And if we go to the next slide, in general in that preamble, did you find an apparatus?
A. Yes. So the Nokia radio head is an apparatus.
Q. Can I put a checkmark?
A. Yes.
Q. And do you see the next limitation?
A. Yes, I do.
Q. Has the Court construed this claim?
A. Yes, they have.
Q. Why does the definition have two parts?
A. Okay. So this is -- this claim starts with the words, means for oversampling. And the way in which this has been construed, it's construed under a certain part of the law which is called § 112, ¶ 6. I'm not an attorney, but the way I understand it is that it means that the construction means that you have to have a function, you have to define a function, and then you have to define the structure that performs that function because we're on an apparatus claim now.
Q. Why have you already put a green checkmark next to function?
A. I've put a green checkmark there because that function is exactly the same words that we looked at for claim 1. So what it means is that I've already provided evidence that in my

opinion, that the radio products already satisfy that function.

Q. And what is the structure under this limitation?

A. So the structure that has to perform that function is one or more Sigma Delta modulators or flash A to D converters.

Q. And does a structure have to be exactly one of those two things, the Sigma Delta modulator or the flash A/D converter to infringe?

A. It doesn't. It has to be one of those two structures or an equivalent to that structure.

Q. And how does GROOT meet that structure limitation?

A. So I showed earlier that this oversampling function is done by that structure called an RF ADC, a radio frequency analog-to-digital converter. That's the structure that performs this function.

Q. If you look at 855 on the screen, could you show us where the means for oversampling is in this diagram?

A. Yes. So this was the figure that we looked at before. This box here is called the dual RF ADC single DDC. This is the A to D converter that performs that oversampling function.

Q. And are the -- is that ADC that you showed us on the previous slide a Sigma Delta modulator or a flash A/D converter.

A. I don't think it is, but it's the equivalent to those.

Q. How do you know that it's the equivalent?

A. Because it performs the same function, that oversampling. As an analog-to-digital converter, it oversamples at a desired frequency as required by that function.
Q. And so what is your overall conclusion on this limitation?
A. So my overall conclusion is there is such a structure that performs that function, so there's infringement or this limitation can be checked off.
Q. And how has the Court construed the next limitation that starts with, means for isolating?
A. So the means for isolating, the Court has construed that again under this section of law with a function isolating signals of interest in the bit stream, and the structure has to be one or more decimating filters.
Q. And why have you checked off the function here?
A. Because the function is the same function as in claim 1 that I've already provided evidence for.
Q. And what -- does GROOT or the radios including GROOT include this structure of one or more decimating filters?
A. Yes, they do. We looked at that decimating filter in the post non-linear block. That's a decimating filter.
Q. So what is your overall conclusion for this limitation?
A. So, again, this limitation is present in the accused products.
Q. And moving to the third limitation in claim 2, this

starts with, means for isolating source signals. Is that right?
A. Yes, that's right.
Q. And does GROOT perform the function that you've checked off here?
A. Yes, it does. This is the same function as in claim 1. I've already provided evidence for that, so I've put a checkmark next to this function.
Q. And for the structure that talks about one or more decimating filters, where is that in the GROOT?
A. So, again, that's the decimating filter that's in that post-non-linear block. So that is in the accused products.
Q. So is this limitation satisfied?
A. Yes, it is.
Q. And going to the means for computing, in your opinion does GROOT perform the computing function here?
A. Yes, it does. The function that the Court has given us is the same function that's in claim 1. I've already provided evidence to show that that's in the accused products.
Q. And do you see the definition of structure below?
A. Yes, I do.
Q. What is meant by a processor?
A. So a processor is a circuit that is programmable, a bit like perhaps a computer chip or something like that.
Q. And is there a processor in the functionality you

examined?
A. Yes, there is, because the GROOT FPGA is a processor, it's a filled programmable gate array. Like I said, it's this computer-like device that's programmed to perform the cancellation.
Q. And you've put up Exhibit 858 in the next slide. Where do you see GROOT multiplying source signals in the time domain?
A. So we know they're in the time domain because this is done in real time, meaning that as these interferences need to be canceled, we cancel them. But there's evidence of that in this document here where it talks about the non-linear block and it talks about it being in real time.
Q. And so is this -- how does this show the computation or the multiplication?
A. So that is being done by these blocks on the -- in the middle here that's doing all the multiplication for generating the PIM estimate.
Q. And how do you see that the non-linear block is doing that estimate from the source signals?
A. Well, we know it's doing it from the source signals because it says at the bottom you use the two input bands X1 and X2. That was that red path on figure 1 that we talked about earlier. So it's using the source signals.
Q. So, Doctor Wells, what is your conclusion as to this

limitation?
A. So this limitation is also present in the accused equipment.
Q. And looking at the next limitation, so the fifth one in claim 2, in your opinion does GROOT perform the canceling function that's here?
A. Yes, it does.
Q. And how do you know that it performs that function?
A. Well, we know it performs the canceling function because it's the same exact words that we used in claim 1. I've already provided an opinion and showed evidence where I believe that the GROOT does the canceling.
Q. And if we go to PX 839, can you show us which structure in GROOT performs the cancellation function?
A. Yes. So it's this structure in the middle. There's a green box with a minus sign in it. You can see at the top it says that that's where you do the difference calculation via subtraction.
Q. But going back to the construction, doesn't the Court's construction require an adder at the structure?
A. Yes. So the Court said this cancellation should be performed by an adder.
Q. So how can you use a subtractor to satisfy this structure?
A. Because there's an equivalent to an adder. The GROOT

operates with equivalence to an adder.
Q. And when you say equivalents, what do you mean by equivalents?
A. So there's a portion of the law, as has been explained to me, we can infringe literally like I tried to show for claim 1 that everything is literally present, but there is also a thing called the doctrine of equivalents where something can infringe through an equivalent.
Q. And what is required to show equivalents under your understanding of infringement?
A. So under the doctrine of equivalents, the test, as I understand it, is to look at how everything performs. Does it perform substantially the same function in substantially the same way to achieve substantially the same result.
Q. And from whose perspective do you look at to decide if it does substantially the same function, way, and get the same result?
A. A person of ordinary skill in the art.
Q. Do you -- I think that you started to touch on this. Do you apply the doctrine of equivalents to every claim in your analysis?
A. No. That's only applied to this one claim here so far.
Q. And under the doctrine of equivalents, what is the function of an adder?
A. So the function of -- so an adder obviously adds, but a

subtractor is the equivalent of an adder with an inverter in front of it. And I've tried to show that as an example here. If we take a simple piece of math on the left, 5 minus 3, what we do is we subtract 3 from 5 and we get our answer--2.

Now, that operation can also be equivalently done using an adder. If you were to take the 3 and you were to invert the 3, then you've got minus 3. So 5 plus minus 3, if you remember the math the plus and the minus turn into a minus, that 5 plus minus 3, that gives us the same answer--2.

So, in other words, the adder in combination with an inverter is equivalent to a subtractor.

Q. And what have you put on this slide?

A. So this slide is intended to show how we would realize an adder and a subtractor using digital gates. These are electronic units that we use, but what I'm trying to show here is via the colors.

At the top are the digital gates that we would use in a digital system to actually do an addition. On the left you've got A and B, and then you've got the sum at the top. Those are the gates that will produce an adder.

The way in which a subtractor can be implemented digitally is you use exactly the same adder, you use the same circuitry, but you add in these yellow triangles. And those yellow triangles, that's the shape that we use for an inverter.

So what you do is in an adder you actually take one of the signals, you invert it -- sorry, I beg your pardon. So when you make a subtractor, you take one of the signals, you invert it, and you reuse an adder.

Q. So is the subtractor, does it always include an adder?

A. Yes, it can, yeah.

Q. And so talking through the test that you told us for the doctrine of equivalents, do -- does the subtractor have the same function as an adder plus an inverter?

A. Yes, it does because they both have the function of canceling out one or more in-band intermodulation products.

Q. And what was your conclusion as to whether they function in substantially the same way?

A. So I believe they do because they both apply the estimate of the intermodulation products and the desired signal containing the in-band intermodulation products to a canceling structure.

Q. And what about the -- substantially the same result part of this analysis? Is that there?

A. So I believe they do because they both cancel the in-band interference from the desired signal.

Q. And so what was your overall conclusion for this limitation?

A. So my overall conclusion is that the structure of an adder is equivalent to the functionality that's in the accused

products.

Q. And so is this limitation met?

A. This limitation is met under this test called the doctrine of equivalents.

Q. Do you mind if we move to the next limitation?

A. No.

Q. So this long limitation, you've already put a checkmark next to the function part of it. Is that right?

A. Yes, I have.

Q. And how has the Court construed this term?

A. So the function that the Court has provided for this term is exactly the same as in claim 1.

Q. And is that satisfied?

A. Yes, it is. It's the same as in claim 1. I've already looked at that, and I've already showed evidence that I believe that's satisfied.

Q. And what is the construed structure?

A. So the structure is as written at the bottom here. It's a processor programmed to do certain things, to convert the original samples to new samples using weighted interpolation and to map the new sample into the time slots of the original samples and adjust the amplitude by scaling.

Q. So you put figure 11 from PX 3 here. What is this intended to show?

A. So this is from figure 11, and the specification of the

patent tells us that this is how the phase adjustments is being done.

Q. And which part of GROOT performs this operation?

A. So this is in the -- GROOT is a processor that includes the delay functionality that performs the phase adjustments.

Q. And do you see the last part of the limitation requires adjustment of amplitude by scaling?

A. Yes, I do.

Q. Which parts of the accused products handle scaling?

A. So in that non-linear block that we talked about, there's those number of coefficients that were shown in red. They are the amplitude that's applied to the model. That's the amplitude scaling.

Q. And when the structure talks about the mapping the new sample into the time slots of the original samples, what does that mean?

A. So that means that as part of the -- that phase shift, you take the time samples, and as you shift them, you actually map them to the new time samples. That's part of that phase shift, that delay.

Q. And how do you know that the conversion is using weighted interpolation?

A. So we know that that's a common way of doing it. The patent has told us that that's the way in which it's intended to be read, and that's a common way of doing phase shifting.

Q. So is your conclusion literal or under the doctrine of equivalents?

A. Well, I think that it's more likely than not to be done in this way, meaning there's literal infringement. But if there isn't literal infringement, then it's being done an equivalent way, so this would be infringed under the doctrine of equivalents.

Q. How would the non-linear and post non-linear blocks that you mentioned infringe under the doctrine of equivalents?

A. Because they would perform the same function in the same way to achieve the same result.

Q. And what result is that?

A. So the result is to an adjusted phase and amplitude of the intermodulation product interfering signal in a closed loop manner.

Q. And so what is your overall opinion as to this limitation?

A. So there is the structure, a processor programmed in this way, that's the GROOT FPGA. So there is such a structure in the accused products.

Q. And so with that, what is your overall conclusion as to claim 2?

A. So claim 2, I can put a checkmark here. That means that claim 2 is infringed under the doctrine of equivalents.

Q. And do you mind if we move to claim 3?

A. Yes.
Q. What is on the screen now?
A. So this is claim 3 from the '134 Patent.
Q. And do you see the preamble highlighted there?
A. Yes, I do.
Q. What kind of claim is this?
A. So this is another apparatus claim.
Q. Are the accused products an apparatus within the meaning of this preamble?
A. Yes, they are. They are a physical product.
Q. Can I check this off?
A. Yes, you can.
Q. And then if we look at the first limitation, how has the Court construed that?
A. So the Court has also construed this under the section of the law where there needs to be a function and a structure.
Q. And if we look at the functionality, would you mind comparing that to claim 2?
A. No. Of course.
Q. How would you compare the functions between these?
A. So you can see that the -- I've highlighted here in green the similarities between the function and the structure, and you can see the only difference in claim 3 is that, instead of oversampling, it just requires you to sample.
Q. So does -- well, what do you mean by only requires

sampling to satisfy claim 3?
A. Well, it means that you -- it means that you just have to sample. You can oversample, you can sample. That's within claim 3. So claim 2 specifically is oversampling. But if you oversample, you sample. So that means that the function of claim 3 is also met.
Q. And so what about the structure? Is that satisfied in claim 3?
A. Yes, it is. It's the same structure as claim 2 which I've already provided evidence on.
Q. And so what is your overall conclusion for claim 3's first limitation?
A. So I believe this is also within the accused products.
Q. And so if we move to the next limitation, is this limitation a means-plus-function term?
A. No, it's not.
Q. How do you know that?
A. Because it wasn't construed that way.
Q. And this reads, "One or more filters to isolate signals of interest and interfering signals in the bit stream." Do you see that?
A. Yes, I do.
Q. Does GROOT include one or more filters for that purpose?
A. Yes, it does. We looked at this for claim 1. Remember there's that filter that isolates those two signals, does it

digitally in the bit stream.
Q. So claim 1 and claim 2 talked about decimating filters. Isn't that different from the filters here?
A. It is. This is, what we say, a little bit broader. Claim 1 actually required the filter to be a certain type of filter, a decimating filter. Here it just requires it to be any filter. So, of course, a decimating filter is a filter, so this is -- this is met.
Q. So are you satisfied that this limitation is met?
A. Yes, I am.
Q. And if we move to the next limitation, is this a means-plus-function term?
A. So this has been construed that way by the Court, yes.
Q. And how has the Court construed this term?
A. So they've construed it as a function and a structure as listed here.
Q. Do you mind if we compare it to claim 2?
A. No, please.
Q. And how would you compare the function for claim 3 in this limitation to the functions for similar claims in claim 2?
A. So you can see that, although they're written in a different style in different sentences, I have highlighted in green here the similarities between the two claims. So what it means is that the functionality that I used in claim 2 will

also carry through to the functionality of claim 3.
Q. And then can you compare the structures between the same limitation in claim 2 and claim 3?
A. Yes. So the structure is the same. It's an adder for claim 2. I showed that that adder was -- with an inverter would be equivalent to a subtractor. So it's the same analysis here for claim 3.
Q. So is this also under the doctrine of equivalents?
A. Yes. Correct.
Q. So in your opinion does GROOT satisfy this limitation of claim 3?
A. Yes, it does.
Q. Do you mind if we move to the last limitation?
A. No, please.
Q. And how has the Court construed this term?
A. So this last term, again the Court has construed this as requiring a function and a structure.
Q. And do you mind if we compare this limitation to claim 2?
A. No, please.
Q. Could you explain what you've highlighted here in green?
A. So highlighting in green, again, is common between the two. You can see the structure is the same. You can see the function, there are some slight differences there in the wording, such as sort of wherein something happens by making. So these are not substantial differences.

Q. So did you conclude that the function in this limitation of claim 3 is met?
A. Yes, I did. I did look at all the words in claim 3 to make sure that it's within what I've looked at for claim 2, but my opinion is is that claim 3 is also met or these -- these words of claim 3 are also met.
Q. And could you compare the structures between this limitation for claim 2 and claim 3?
A. Yes. So the structure is exactly the same.
Q. And for this limitation, did you consider there to be infringement literally or under the doctrine of equivalents?
A. So under both.
Q. And so what is your conclusion as to this last limitation, claim 3?
A. So this is the same structure as in claim 3, so we can -- as in claim 2, so we can apply my previous analysis here to show that this is met for claim 3.
Q. And so what is your overall conclusion as to whether claim 3 is infringed?
A. So claim 3 is infringed, in my opinion, under the doctrine of equivalents.
Q. And so we finished the claims for the '134 patent. Is that right?
A. Yes, we have.
Q. Would you please look at PX 4, so it would be the next

one in the notebooks, the '775 Patent with me now?
A. Yes. So we moved on to the second patent now, the '775 Patent.
Q. And which claims of the '775 Patent did you analyze for infringement?
A. So there's actually seven claims being accused here. These are the claims that are listed on the right-hand side, claims 1, 4, 9, 16, 21, 29, and 36.
Q. And does AT&T infringe these seven claims literally or under the doctrine of equivalents?
A. So in my opinion, AT&T infringes all of these claims literally.
Q. And if we turn to the abstract of the '775 Patent, what is the general purpose of the patent?
A. So this is -- of course, this is a different patent, but it's addressing interference mitigation processing methods for canceling of intermodulation products. So its objective is similar to the '134 patent.
Q. And for your infringement analysis, do you compare the AT&T radios to the abstract for that?
A. No. I compare them to the claims of the patent.
Q. And so only the claims.
A. Correct.
Q. If we look at claim 1, what's highlighted up at the top?
A. So this is the preamble of the first claim of the '775

Patent.
Q. And has the Court construed any terms in this preamble?
A. Yes. So this preamble has the term a transmitter and the receiver being co-located with each other, and the Court has construed that to mean a receiver located in the vicinity of the transmitter.
Q. And whenever the term co-located is used in the '775 Patent, have you applied the Court's construction?
A. Yes, I have.
Q. Do you see, Exhibit 855, figure 1 is back on the screen. Does GROOT include a transmitter and a receiver co-located with each other?
A. Yes, it does.
Q. And what are you showing us here?
A. So this is showing, in yellow, the functionality that's part of the transmitter of the Nokia radio, of a base station. What is shown in blue is the receiver.
We know -- you can see that the two are alongside one another, they are in the vicinity of one another. But we also know that because on the top right-hand side where we have the antenna, these two, both the transmitter and the receiver, are connected to the same antenna, which is here.
They are connected to the same antenna, so the two of them are within the vicinity of one another.
Q. And do you see the other part of the preamble mentions a

method?
A. Yes. This is a method claim, and we know that this is a method because it says here GROOT's primary requirement is to perform passive intermodulation, PIM distortion cancellation, and then at the end, thus removing it from the receive data. So this is describing a method once more.
Q. And so have you found that the preamble is satisfied here?
A. Yes, I have. So we can put a checkmark on the right-hand side.
Q. And what have you done with this limitation? It looks like a single limitation in claim 1.
A. Yes. So what I've done here is if you actually see the limitation as it's written in the patent, this is all written as one paragraph, if you like. We call it one requirement, one limitation.
Just to make it a little bit easier to follow along, what I've done is I've sort of broken that out into parts and we'll look at each one of those parts that together makes up that one limitation. This is really just to try and make it perhaps a little bit easier to follow.
Q. Thanks.
Can you look at that first part of this limitation?
A. Yes.
Q. And do you see the phrase 'transmitter signals' in that

first part?
A. Yes, I do.
Q. How has the Court construed transmitter signals?
A. So the Court has used that transmitter signals to mean signals output by a transmitter.
Q. And have you applied this construction in analyzing the '775 Patent?
A. Yes, I have.
Q. Do you see figure 1 again from Exhibit 855?
A. Yes, I do.
Q. Can you please show us where in figure 1 you see GROOT using copies of transmitter signals of the transmitter?
A. Yes. So that is in this red path. There is a downlink TX reference that's in the red path. And we know that they are copies of the transmitter signal because the transmitter signals are coming on here through to the antenna and out.
But here we have what we call a coupler. And what that coupler does is it takes the transmitter signals and it couples off, it samples -- well, not -- it sniffs off, it couples some of that analog signal, and it passes it back down here.
So that is a coupler that is using -- so the GROOT functionality is using a copy of the transmitter signals of the transmitter.
Q. And sticking with figure 1, which part of the GROOT

diagram shows GROOT canceling passive IMPs in the receiver?
A. So we know GROOT does canceling. We've looked at that previously. That's done in this subtractor here where the PIM model is subtracted from the actual interference that comes in.
Q. And how do you know that the passive IMPs that are being canceled are in the receiver?
A. Well, we know that they're in the receiver because that's where the intermodulation elements are that we're trying to cancel.
Q. And where would we see that PIM coming in on a path in this diagram?
A. So that PIM comes in on the receiver on the brown path, which includes the uplink and the actual interference.
Q. And do you see the next slide shows Exhibit 858 at page 2164. It says figure 3 at the bottom. What does this show relative to the limitation?
A. So this is the non-linear block we looked at before. This is what actually generates those estimates, those intermodulation product cancellation signals. And we know it uses copies of the transmitter signals of the transmitter because it's two inputs on that red path that we looked at.
Q. And so there's another part of this claim language that I want to look at it. It says continuously and near real time. How do you know that's something is done in near real time?

A. Well, we know that because this is how the system operates. You can see here I've highlighted in yellow, this operates in real time.
Q. And what does -- is there a difference between -- like here up top, it says near real time, but in the picture here from the exhibit, it says just real time. Does that matter?
A. I don't think that -- well, the words of the claim are important, but near real time -- if something is in real time, it's happening in real time, then it's happening in near real time.
Q. So if it is in real time, does it mean that it's satisfied?
A. Yes, I think so.
Q. And if we go to -- this is Exhibit 855 at 1979. What have you highlighted here for continuously?
A. Yes. So the claim also requires this cancellation -- or I beg your pardon, the generating to be done continuously. And this is being done continuously because we have this wide and this narrow delay search.
Remember, I pointed to this earlier and it talked about how you do -- in the middle there, it says that you need to run this routine frequently. At the bottom, it says that you need to run this every time PIM estimation is being done. In other words, this is being done continuously.
Q. And so do you consider this first part of claim 1 to be

met?
A. Yes, I do.
Q. And if we look at the next element you've highlighted there, what does this part of the limitation describe?
A. Yes. So I've put the previous section in green because I believe that it's satisfied. We're now looking at what's highlighted in yellow. So this talks about where the passive IMPs are generated, where in the structure are they generated.
Q. And do you see we have figure 1 from Exhibit 855 again?
A. Yes, I do.
Q. What have you highlighted here?
A. So this is in the top right-hand corner. Remember, the dotted box there shows the PIM sources. This shows where the PIM interference actually occurs. And the claim requires that the passive IMPs are generated in passive transmitter components of the transmitter and receiver components of the receiver. Those areas there--the antenna, the cable, and everything--that's connected to both the transmitter and the receiver. So PIM is generated in those passive components that are part of the transmitter and the receiver.
And then the claim also requires it to be after a high-powered amplifier and transmitter filter of the transmitter. This is a high power amplifier. This is a transmitter filter of the filter -- I beg your pardon, a transmitter filter of the transmitter.

We know it's of the transmitter because it's connected to the transmitter and has actually got a TX inside, meaning it's a transmitter.

Q. So the claim, though, it says, high powered amplifier, HPA. So why did you point us to something that just says PA?

A. So this PA here, although it's labeled a PA, a power amplifier, one of ordinary skill would understand this is what we also -- we can also call this a high power amplifier. And the reason for that this is the last amplifier before that signal is -- is boosted and sent out through the antenna. So it's a high power amplifier.

Q. So do you consider this second part of claim 1 of the '775 Patent to be satisfied?

A. Yes, I do.

Q. And what does the next element in this limitation require?

A. So this is a wherein clause, and this requires the transmitter filter to be positioned in a certain place.

Q. And when you say wherein clause, what does that mean?

A. Well, it's just -- it's just -- it's referring the previous limiter -- the previous thing that I've highlighted talks about a transmitter filter, and this is giving us further information about that transmitter -- I beg your pardon, that transmitter filter.

Q. And if we go back to figure 1, where is there a

transmitter filter?
A. So this was the picture I just showed before. This is the transmitter filter. It's called a front end filter duplexer. It applies to the transmitter because it's part of the transmitter path. And you can see the letters TX in there as well, very small, but that's the transmitter filter.
Q. And how do you see that it's coupled between the HPA and an antenna used by the transmitter?
A. Well, we know it's coupled between the HPA, the high power amplifier, because this is the high power amplifier, the PA, this is the antenna, and you can see that it's coupled between the two.
Q. What do you mean by coupled?
A. Coupled simply means connected together. Two things are connected together, they are coupled.
Q. Okay. So do you consider this third part of claim 1 to be met?
A. Yes, I do.
Q. And moving on to the long last part of the claim, what does this describe?
A. Yes. So this is -- this is written using a lot of words and some math, but it's -- it's really wherein where you generate the ICSs. The ICSs are the intermodulation product cancellation signals. So it says how you generate those cancellation signals.

Q. And so focusing on one part of this element first, what is a non-linear process?

A. So a non-linear process is a process that mathematically is -- is non-linear.

Q. And so how does that connect the power series description that says a power series description of a non-linear process?

A. So a power series description, if I could try and explain that through some -- some math here, when we have 10 to the power of 1, it means 10. If you have 10 to the power of 2, that's 10 squared. What that means is it's 10 times 10. It's a hundred.

10 to the power of 3, we commonly call that 10 cubed. That's 10 times 10 times 10. And, in fact, if we generalize that, 10 to the power of x means 10 times 10 times 10 x times.

Q. And what does the series part have to do with the powers?

A. So what the series part means is, series means we add these together. So the series of those 10 to the powers would be 10 to the 1, plus 10 to the 2, plus 10 to the power of 3, and dot dot dot, so on.

Q. So does it always have to be 10?

A. No, it doesn't. I just used that as an example. The way in which we would write that mathematically is we would use the value x because x is a variable. And so we would say that this power series would be x to the power of 1, plus x to the power of 2, plus x to the power of 3, and so on.

Q. And so what have you shown here relative to the power series?

A. So this equation here is really the generalization -- mathematically the generalization of what I tried to show before. So this is the power series description.

The big squiggle, the sort of E shape on the left-hand side, that's the Greek signal Sigma. We use that in math to mean a sum, a summation. And you can see that that's equal to a0. That's a constant. a1x to the power of 1, x to the power of 2, plus x to the power of 3, plus x to the power of 4, and so on. So this is a power series description.

Q. And how does the power series description connect with intermodulation products?

A. So we use this power series description to -- to look at intermodulation products because we are looking at the third order intermod, the third order intermodulation product. What we do is we use this third power, something to the power of 3, which remember is x times x times x, then we use that for mathematically modeling the intermods, the Intermodulation Products.

Q. And so do you see page 2164 of Exhibit 858 on the screen?

A. Yes, I do.

Q. What does this show for the power series description?

A. So this is the non-linear block within GROOT and embedded in here rather small, but maybe, Mr. Boles, if we could -- if

we could blow up the yellow thing on the right-hand side. Thank you.

So this is showing some of the math that goes into generating these third order intermods. And you can see that in the top block, you've got these value x1 times x1 with two lines. That means the modulus of x1 squared. So it's x1 times the modulus of x1, times the modulus of x1. Underneath that, you can see x1 times x1, times x2 prime. Then you can see x1 times x2 modulus squared.

So this is where the non-linear process is being performed.

Q. And so if we go to the next page in Exhibit 858, what does this show relative to the power series description?

A. So this is showing that the -- the math that is in that previous slide being -- being written out, and you can see that there's a number of equations there that have that a0, that a1, those coefficients, and then it has these x1 and these x2 values, these two signals being acted upon.

Q. Can you show us where you see the a0 and so on the screen?

A. Yes. So a0 is here.

Q. Okay. So it's on the left?

A. Yes.

Q. And then -- so at the bottom of the page, do you see where it says, the non-linear engine? What does that mean?

A. So that's the non-linear engine in GROOT. It's that NL block that we just looked at. That's called the non-linear engine.

Q. And can we look at the claim language again for a second?

So do you see that the claim says S1, S2, and S3. Do you see that?

A. Yes, I do.

Q. How has the Court construed the term three signals, S1, S2, and S3?

A. So they said that those signals, they are signals which must be separately identifiable but are not limited to three unique input signals.

Q. And so are S1, S2, and S3 to be found inside GROOT?

A. Yes, they are.

Q. If we go back to the page we were on before from Exhibit 858, how are S1, S2, and S3 used in GROOT?

A. So if --

THE WITNESS: Mr. Boles, if you could blow up the non-linear engine is capable of modeling at the bottom and the thing under that. Thank you.

So this is showing what the non-linear engine in GROOT is capable of doing. And if we look at that -- please ignore the highlights. I think that's wrong. But if we can just look at the very first term there, it's x1 times x1 with these lines, the modulus of x1 squared. That is x1 times the modulus of

x1, times the modulus of x1, it's three signals being multiplied together.

It says next to it, or you could have x1 times x1, times x2 prime. That's showing that you've got an input x1, multiplied by the input x1, multiplied by -- the prime means the complex conjugate of the input x2. Those little dots, by the may, just means multiplied. So it's showing that you've got three distinct signals being multiplied together.

The second line also shows another one, x1 times the modulus of x2 squared. That's x1 times the modulus of x2, times the modulus of x2. It's three unique signals or three separately identifiable signals being multiplied together.

Q. And for all of these -- can you show us an example of how those first two lines could be the S1, the S2, and the S3?

A. Yes. If I could draw on the screen. Maybe I could have a black screen or a white screen?

So if I try and draw what we just saw in GROOT, so the first one was x1 times x1, times x2 prime. The second one was x1 times x2 squared. So if I try and draw out what they would be, S1, S2, S3, so in that first instance S1 would be x1, S2 would also be x1, and S3 would be x2 prime.

In the second one, x1 is S1, the modulus of x2 is S2, the modulus of x2 is S3. So in each one of those calculations that's done by GROOT, there are three separately identifiable signals. I'm able to identify what is S1, I'm able to

identify what is S2, and I'm able to identify what is S3.

Q. But in each of these lines, aren't you really just using two signals in each line to do this mapping?

A. I am. You can see that I'm using the signal -- in the first line, I'm using the signal x1 once. I beg your pardon. I'm using the single -- let me start again.

I'm using the signal S1 twice, and I'm using the signal x2 once. But even though I'm using those, that still fits within the Court's direction. I have three separately identifiable signals, but they don't have to be unique signals. I can use the same signal twice.

MS. GRIFFITH: And could we go back to the slides, please, Mr. Boles?

Q. (BY MS. GRIFFITH) Mr. Boles is helping us with slides.

MS. GRIFFITH: Thank you.

Q. (BY MS. GRIFFITH) Going back to the Court's construction, what do you mean like when you say that there's three signals, do you -- is separately identifiable different from three unique input?

A. Yes, it is. So if we look at the Court's construction here, if I can read it again, the three signals, S1 and S2 and S3, they must be separately identifiable. I believe I've shown that those three signals are separately identifiable. But they're not limited to three unique signals.

So they don't have to be three unique signals. We can

have two unique signals as long as those two unique signals have three separately identifiable signals that are multiplied together.

Q. And could you show us what you meant by this slide here?

A. Yes. So this slide here, what I've done is I've taken -- if you look at the claim language across the top of the slide, you can see that there's actually seven multiplications that have to be done between this S1, S2, and S3.

I've listed those in this table on the left-hand side, and I've said, okay, so using that mapping that I just showed, I'm actually using the second example there where I said x1 was equal to S1 and S2 is equal to x2 and S3 is equal to x2, these are how they would map the GROOT and each one of these multiplications is performed in that non-linear block.

Q. So are they separately identified here?

A. They are separately identified because that is S1, those are S2, and these are S3. I'm able to separately identify these.

Q. And do you see on this slide, the claim language says generating an Nth order ICS where N is an integer?

A. Yes, I do.

Q. What does an Nth order mean?

A. So an Nth order means to the power of N where N is an integer.

Q. And so where do you see an Nth order or something to the power of N in this slide?
A. So I've done this by doing the N to the power of three. That's this third order intermod products that we've been looking at.
Q. And where do you see the -- well, the signal to the power of three?
A. Well, we know it's signal to the power of 3 because we are multiplying these -- these together to model what we call IM3, third order intermodulation products. That's N equals 3 in that mathematical equation.
Q. And what about -- are there any other orders here?
A. Yes. I mean, you could apply it for N equals 5 as well because you can actually use this as well to find what they call IM5, which is fifth order intermods, intermodulation products.
Q. And then moving on to the rest of that element from the limitation, do you see where it says, digitally multiplying and filtering?
A. Yes, I do.
Q. How is that present in GROOT?
A. Well, that's present as well because we've shown that everything is in the digital domain, we've shown that everything is these numbers are all multiplied together, and we know that they're filtered as well because we have -- as we

talked about earlier, we have filters to isolate these intermodulation products.

Q. And is that what you see in figure 4 from Exhibit 858?

A. Yes, yes. So we know that this non-linear block is responsible for filtering the non-linear modeled signal.

Q. And so what was your conclusion as to claim 1?

A. So I've looked at each one of those requirements here. I believe they're all present in the accused products. So we can put a checkmark next to this.

Q. And what's your overall conclusion as to whether the accused products infringe claim 1 of the '775 Patent?

A. So that means that in my opinion claim 1 is literally infringed.

Q. Can we move on to claim 4?

A. Yes.

Q. What is on the screen here?

A. So this is claim 4, the next asserted claim for the '775 Patent.

Q. And do you see the preamble here?

A. Yes, I do.

Q. Is that preamble in your opinion satisfied?

A. Yes, it is. We know that this is a method for canceling passive intermodulation products.

Q. And so is that -- if we look at the next limitation, how have you broken this out here?

A. Yes. So, again, this claim is written as a long limitation. I've divided it out here to try and make it a little bit more readable, and you will see there's a lot of commonalities between this and the previous claim.
Q. And so do you see this first part that's highlighted?
A. Yes, I do.
Q. Do you see where it says a priori?
A. Yes.
Q. What does that mean?
A. So that's a term that means -- I guess it means -- it means known beforehand. It's already known.
Q. And is that a construction from the Court?
A. No, it's not.
Q. Where did you get that understanding?
A. So I think that's a term that's used in perhaps Old Latin or something, but that's what the term means. A priori means you know in advance.
Q. If we look at figure 1 again, what have you marked here?
A. So here I have marked again on the radio product, the transmit path, and the receive path. The transmit path is in the top in yellow; the receive path is in blue below.
Q. And do you see where it says 'in a baseband digital signal set'?
A. Yes, I do.
Q. Where is that in this figure 1 of Exhibit 855?

A. So this is -- the baseband digital signal set is within the GROOT FPGA. That's where you generate these intermodulation signals.
Q. And if we look at -- I'm just cleaning it up.
If you look at the part that says 'a priori knowledge based on the transmitter signal set', where do you see that in this slide?
A. Well, this is the a priori knowledge of the transmitter signal set. That's because we know which frequency we're transmitting on. So we have knowledge of the transmitter signal set. And then remember we have this red line as well which is used to generate these signals and that's based on the transmitter signals.
Q. And so if we go to Exhibit 858 at page 2164, do you see figure 3 there?
A. Yes, I do.
Q. And does this -- how does this relate to what you've highlighted from the element up top?
A. So I've highlighted at the top, this is required to be done continuously and in real time. We know that this is in -- these are generated in real time. We know that.
Q. And if we go to the next element of this limitation, if we look at that with figure 1, do you see 'GROOT having digital copies of the transmitter signal set passed to a receiver'?

A. Yes, we do. And if I might just quickly go back to the previous one, there was also continuous as well, and I previously showed that this was being done continuously because of that delay search function.

So I beg your pardon. Can you ask the next question again, please?

Q. Yes, sure. Thank you for clarifying.

Where do you see in figure 1 digital copies of a transmitter signal set getting passed to the receiver?

A. We know this is in this figure as well because we have the RF ADC here that converts the analog signals to a digital signal, it passes digital signals -- it passes digital signals of the red line, the transmitter signal set, to the GROOT FPGA.

Q. And sticking with figure 1, if we look at the rest of that element language, where is that satisfied in figure 1, the part with 'the passive IMPs are generated' to the end?

A. Yeah. So this is similar to the language we looked at before. It requires that those passive IMPs are generated in the transmitter and receiver chain after a high power amplifier and after transmitter filters of the transmitter.

This is the high power amplifier. This is the transmitter filter of the filter [sic]. It requires the intermods, the passive intermodulation products to be generated after those, and they're generated in at least the

antenna and the cable and the interface, which is after those components.

Q. So do you consider this element to be satisfied?

A. Yes, I do.

Q. And you've highlighted two of the parts of the limitation in yellow. Right?

A. Yes, I did.

Q. Would you compare those to what's highlighted in yellow from claim 1?

A. Yes. So the language between these two is essentially identical. The last limitation is identical. The other one actually has some slight things. It says, 'wherein the transmitter filters' instead of 'the transmitter filter', and that's because of the next limitation. But these are essentially the same.

Q. And so do you consider these to be satisfied in claim 4?

A. Yes, I do.

Q. And looking at the remaining element, it reads, 'wherein the transmitter filters are configured to significantly reduce active IMPs in-band of a passband of the receiver'. Do you see that?

A. Yes, I do.

Q. What are active IMPs?

A. So there's actually two sorts of these intermodulation products. So far we've been focusing almost exclusively I

think on what we call passive intermodulation. But there's also a second type of intermodulation products called active intermodulation, and this is requiring the filter to also reduce active intermodulation products.

Q. And where is the -- where are the transmitter filters that are used here?

A. So the transmitter filters that are required here, that's this at this point here.

Q. And how do you know that that's configured to significantly reduce the active IMPs in-band of a passband of the receiver?

A. Well, we know that because the Nokia documentation tells us that this group product is designed to filter both the passive intermodulation products that we've been focusing so far but to equally filter out active intermodulation products.

Q. And where is the reduction happening in the transmitter filters?

A. So that's happening in this front-end filter duplexer.

Q. And so do you consider this last element of the limitation to be met?

A. Yes, I do.

Q. And so what is your overall conclusion for claim 4?

A. So claim 4, I believe that the evidence shows that everything is practiced in claim 4, so there's infringement of claim 4.

Q. Do you mind if we move to claim 9?
A. No.
Q. This one looks shorter but has some -- it says, 'the method of claim 4'. Do you see that?
A. Yes, I do.
Q. What does that mean to say, 'the method of claim 4' inside a different claim?
A. Right. So this is what we call a dependent claim. So you may remember from the video that there's two sorts of claims. There's what's called an independent claim that stands on its own. Everything we've looked at so far is an independent claim.
But this is what's called a dependent claim. It means it depends on another claim--in this case, claim 4. So what that means is it means everything in claim 4 plus what is in here is required for claim 9.
Q. And have -- what was your conclusion for claim 4?
A. Well, this is intended to show that. We've already looked at claim 4. I've already put a checkmark against claim 4, so I believe claim 4 is already infringed.
Q. And does that mean that you have to reanalyze claim 4?
A. I don't have to reanalyze it, no, because we've already analyzed it. But claim 4 is part of this, so as part of claim 9, I have to show that claim 4 is met.
Q. And so do you mind if we move to the next limitation?

A. No.
Q. So this talks again about going up to n in number. Do you see that?
A. Yes, I do.
Q. So here you've shown us Exhibit 858 at page 2165. Do you see that?
A. Yes, I do.
Q. How does this page relate to digitally multiplying and filtering?
A. So we've talked about before how these mathematical functions here are digitally multiplied, how they're filtered, but we also know that they generate what we call third order intermodulation products. That's IM3. And fifth order intermodulation products, that's the number n. And n is equal to 3 or n is equal to 5.
Q. And so which are the odd numbers here?
A. Well, both 3 and 5 are both odd.
Q. And how do we know that the multiplication is from the transmitter signal set?
A. Well, we know this because we know that you use two transmit band input signals, that's the x1 and the x2. That's the two signals that are in that red path.
Q. So do you consider this limitation to be met?
A. Yes, I do.
Q. And so what was your overall conclusion for claim 9?

A. So it's my opinion that claim 9 is also met, so I've put green checkmarks here.
Q. And if we move on to the next slide, what is shown here?
A. So this is claim 16, the next asserted claim.
Q. And the preamble says 'a method comprising'. Is that, in your opinion, satisfied?
A. Yes, it is. I've shown that there's a method a number of times.
Q. And moving to the next limitation that starts with 'receiving a digital copy of a transmitter signal at a receiver', do you see that?
A. Yes, I do.
Q. If we go back to figure 1, our favorite figure 1 from Exhibit 855, where do you see 'receiving a digital copy of a transmitter signal at a receiver'?
A. Yeah. So we know that this red path here that's coupled from the transmitter path, we know that that's a transmitter signal. It's coming into the receiver. And we know that you receive at this point here the signal is converted from analog to digital and it's coming into the GROOT FPGA. So we know that we're receiving a digital copy of the transmit signal at a receiver.
Q. And if we look at the rest of the element, it says, 'the receiver co-located with a transmitter that generates the transmitter signal'. How is that met here?

A. So, again, this language is similar to language that I've already talked about. It says that the receiver is co-located. The Court gave us a construction for that which is 'in the vicinity of', and -- or paraphrasing it, it's 'in the vicinity of', so the receiver is co-located with the transmitter.
Q. And so do you consider this limitation to be infringed?
A. Yes, I do.
Q. Do you see the next limitation in claim 16?
A. Yes, I do.
Q. Do you see the ones that are highlighted?
A. Yes.
Q. Would you compare those highlighted parts to what's highlighted from claim 1?
A. Yes. So, again, if we look at -- compare claim 1 and claim 16, you can see, again, there's a lot of commonality between the language in the two patents, in the two claims.
Q. And if we look for the differences, do you see where it says 'digital passive' in claim 16?
A. Yes.
Q. How is 'digital passive' and 'digitally satisfied' in the accused products?
A. Well, this is related to the generating the intermodulation products. We know that that generation is being done within the GROOT FPGA. It's being done digitally.

Q. And in claim 16, it says, 'falling within a receiver passband', but in claim 1, it says, 'in the receiver'. How would you compare those two?
A. So, I mean, the words are different, but they are essentially meaning the same thing. You are canceling out passive intermodulations that are occurring in the receiver. They fall within a receiver passband.
Q. And so what is your conclusion as to this limitation in claim 16?
A. So because all these words are either the same or they're met in claim 16, using the analysis that I've already shown for claim 1, I believe I've shown evidence for everything in this limitation.
Q. And so what is your overall conclusion for claim 16?
A. So we can put a checkmark against this last limitation, and overall it's shown that this whole claim is being used.
Q. Do you mind if we go to claim 21?
A. No.
Q. And what's on this slide?
A. So this is claim 1. Again, a lot of similarities between the previous claims, but the big difference here is now claim 21 is an apparatus claim. So as I tried to explain before, methods is a procedure or a way of doing something; an apparatus claim is a piece of equipment, a physical or a piece of equipment that does something.

Q. And do the accused products comprise an apparatus that's like the one in the preamble here?
A. Yes, they do.
Q. How do you know that?
A. Well, we've looked at that term previously, and it means that it's a -- Nokia radio head as used on Alcatel's network is an apparatus, a piece of equipment.
Q. On Alcatel's network?
A. I beg your pardon. On AT&T's network.
Q. And moving to the next limitation, do the accused products have a transmitter?
A. Yes, they do.
Q. And what about a receiver co-located with the transmitter?
A. Yes, they do. Remember that figure 1 has the transmitter, it has the receiver, the two are connected by an antenna. They are co-located.
Q. And then do you see how the next limitation requires circuitry to perform interference cancellation?
A. Yes, I do.
Q. What is the circuitry that's described here?
A. Well, this circuitry, the intermodulation cancellation is being performed in this GROOT FPGA. This GROOT FPGA is like a chip that's programmed to do that, so it has internal circuitry inside it that can be programmed to perform this

interference cancellation.
Q. And so do you see this last long limitation in claim 21?
A. Yes, I do.
Q. Do you mind if we compare that to a different claim in the '775 Patent?
A. No, please.
Q. Could you compare the last limitation in claim 16 with the last limitation in claim 21?
A. Yes. So everything that's in green on the right-hand side is already in claim 16, which I've already analyzed and talked about. So there's a lot of commonalities.
Q. And if we look at the parts that are different, where did you see 'using copies of transmitter signals'?
A. Well, we've dealt with that term on another claim. That's that red path that couples off some of the transmitter signals, and you use copies of transmitter signals.
Q. What about the part that says 'the passive IMPs are generated in passive transmitter and receiver components'?
A. So we know that, again, from the figure 2 it has the dotted block in the top right-hand side that shows where all the intermodulation products are generated, and they are generated in passive antennas, connectors, those sort of things. They are passive transmitter and receiver components.
Q. What about the last part highlighted here where it talks about the circuitry being further configured?

A. So it uses the words 'wherein the circuitry is further configured', so that's saying wherein the circuitry--I said the circuitry in the GROOT FPGA--so wherein the GROOT FPGA is further configured to perform the mathematics that we've looked at before.
Q. And so what was your conclusion for this whole limitation?
A. So I believe that this is all met by the accused products.
Q. And what was your opinion as to the whole of this claim 21?
A. So there's checkmarks against every limitation here, so there is infringement of this claim.
Q. And do you mind turning to claim 29 now?
A. No.
Q. So this first part of claim 29 says 'the apparatus of claim 23'. Do you see that?
A. Yes, I do.
Q. And what does that mean to say claim 23?
A. So, again, this is a dependent claim. This claim 29 depends upon claim 23.
Q. And do you see claim 23 also on the screen now?
A. Yes, I do.
Q. What does claim 23's first line say?
A. So claim 23 is also a dependent claim that is dependent

upon claim 21.
Q. Is it okay to have a dependent with a dependent?
A. It is. You are allowed to nest these claims together. So in this case claim 21 is the independent claim, claim 23 depends on 21, and claim 29 depends on 23, which depends on 21. It's complicated, but it's allowed.
Q. And have -- what was your opinion on infringement of claim 21?
A. Well, we already looked at claim 21 on the right-hand side, and in my opinion I've shown that claim 21 is already satisfied.
Q. So what about the next limitation, 23? It says, 'capture transmitter signals as analog signals at a transmitter output'. Do you see that?
A. Yes, I do.
Q. And if we go to figure 1 again, what have you shown here on the screen?
A. So this is showing where the apparatus captures the transmitter signals. It's that coupler that I talked about that sniffs off some of the transmitter signals.
Q. And does that show that it's an analog signal?
A. Yes, it does, because we know at this point here that the signal is ready for transmission. It's in the form of that wave. It's an analog signal.
Q. Can you explain what it means to be at the transmitter

output?
A. Yes. So the functionality essentially on the left-hand side of this figure is digital; on the right-hand side of this figure it's analog. We need to have an analog signal so that we can transmit that wave. Analog means it's actually in the form of a wave form.
Q. So do you consider this limitation to be met?
A. Yes, I do.
Q. And what about that last limitation? It starts with 'down converting and sampling'. Do you see that?
A. Yes, I do.
Q. If we go back to figure 1 from Exhibit 855, what have you shown here for this limitation?
A. So this is where the down conversion and sampling is performed. So the blue arrow is showing that, pointing to the RF ADC.
Q. And you've pointed to the RF ADC before for sampling and oversampling, but how can it be down converting, too?
A. So it also has to do what we call -- one of ordinary skill in the art would understand is down conversion because the analog signal at the antenna is at a very high frequency. It's typically about 2,000 megahertz or something like that. This has to be down converted so that the RF ADC can process it.
Q. And how do you know that it's doing the down conversion

and sampling on the captured transmitter signals?
A. So we know that because that's been done on the red path which is the captured transmitter signals.
Q. And are those copies?
A. They are copies because we couple off the transmitter signal to make a copy of them.
Q. How do you know that then those are used to generate the ICSs?
A. Well, we know that because, as we've talked about before, the output of that RF ADC goes to the GROOT FPGA where there's that non-linear model for generating the intermodulation products.
Q. So do you consider this whole limitation to be satisfied?
A. Yes, I do.
Q. And so what does that mean for your analysis of claim 29?
A. So that means for my analysis of claim 29 that I can say that that limitation, the apparatus of claim 23 is met.
Q. And claim 29 has a couple more limitations. Do you see that?
A. Yes, I do.
Q. And if we look at what's highlighted, you've put claim 9 below. Can you explain to us what you've compared between these highlights?
A. Yes. So we've already looked at claim 9. I have shown that the words of claim 9 are, in my opinion, in the accused

products. The limitation in claim 29 uses the same words.
Q. And so what is your conclusion as to this limitation?
A. Because of the evidence I've shown in claim 9, I can apply it to that first limitation of claim 29 and show that that's met.
Q. And what about the second element in claim 29? What does that require?
A. So that requires something new. It says you filter the results to selectively create n-th odd order active ICSs.
Q. And how do active ICSs compare to the active IMPs that you talked about before?
A. So they're the same thing. The ICS stands for intermodulation cancellation signals. That's the intermodulation signals we talked about before.
Q. And do you see Exhibit 855 at page 1965 on your screen?
A. Yes, I do.
Q. Where do you see filtering of results in the accused products?
A. So we know that the filtering of the results is in that non-linear block. We talked it being a decimating filter in the non-linear block that filters the outputs.
Q. And how do you know that it's filtering to make odd order active IMs?
A. Because we've been dealing with third order intermodulations, and n is 3; 3 is odd.

Q. And so what is your overall opinion on the limitation?
A. I wonder if we could quickly go back to the last slide, if I could explain what's been highlighted there.
Q. Yes.
A. This shows that -- from PX 855, I've highlighted this and it's saying that the -- that once the -- it's saying that the PIM-C block, that's the GROOT FPGA, it can't distinguish between AI, which is active intermodulation, and passive intermodulation. All it knows is that there's intermodulation. So this is showing that you're filtering the active ICSs as well as the passive ICSs.
Q. And this language on this slide, doesn't it show that there is a problem with memory effect from superimposing?
A. Yes, it is. The last sentence is saying that, but it's only in the instance where you have the active and the passive superimposed on top of one another. If they're not, then GROOT will deal with the two of them.
Q. And so do you consider this limitation satisfied?
A. Yes, I do.
Q. What about claim 29 as a whole?
A. So claim 29, because I've shown evidence I believe that the -- that's infringed by the accused products, it's infringed.
Q. And do you see our last claim of the day, claim 36?
A. Yes, I do.

Q. Can we please look at that?
What is the preamble requiring you to show?
A. So this, again, is an apparatus claim. It claims an apparatus, a piece of equipment.
Q. And are the accused products an apparatus that satisfies this?
A. Yes, they are.
Q. How is that?
A. Because they are a physical product that contains what else is in this claim.
Q. And do you see the two limitations here, the transmitter and the co-located receiver?
A. Yes, I do.
Q. Do you believe that the accused products comprise both of those?
A. Yes, they do. We've shown this a number of times. There's a transmitter. There's a receiver. The receiver is in the vicinity of the transmitter.
Q. And so would you consider those limitations satisfied?
A. Yes, I would.
Q. And what about the next limitation? It says, 'circuitry configured to receive a digital copy of a transmitter signal at the co-located receiver'. Do you see that?
A. Yes, I do.
Q. Does the GROOT receive a digital copy of a transmitter

signal?
A. Yes, it does.
Q. Where have we seen that?
A. So we know that that's the output of that RF ADC that takes the transmitter signal, which is the red path, and it presents a digital copy of that to the GROOT FPGA.
Q. And how do you know that that digital copy is received at the co-located receiver?
A. Because we know that the receiver is co-located with the transmitter. That's that figure 1 where the transmitter and the receiver are connected via the same antenna.
Q. And is that performed or configured in a circuit?
A. Yes, it is.
Q. What is the relevant circuit?
A. So that's the circuitry that performs -- that contains the RF ADC and the GROOT FPGA.
Q. And so what is your opinion as to this limitation?
A. So this is also met.
Q. And then do you see the long limitation at the bottom of claim 36?
A. Yes, I do.
Q. You've highlighted some of that in yellow. Right?
A. Yes, I have.
Q. Do you mind comparing that language from claim 36 with the language in claim 16?

A. Yes. So I've put them together here. You can see that the language is the same across the two. There are some slight differences, like instead of 'generating' it has 'generate', but the language between the two is covered -- the language in claim 36 that I've highlighted is covered by the language in claim 16 that I've already analyzed.
Q. So do we need to walk through each of these parts of the last limitation in claim 36 separately?
A. No, we don't.
Q. Do you consider them to be satisfied?
A. Yes, I do.
Q. And why is that?
A. Because it's the same as or essentially the same as what I've looked at for claim 16.
Q. And so what was your overall conclusion for claim 36?
A. So I can put a checkmark against that final limitation. It's my opinion that claim 36 is also met.
Q. And so, Doctor Wells, what was your overall opinion as to each of the 10 asserted claims from the Finesse patents?
A. So I've looked at all 10 of these claims from the '134 Patent, claims 1, 2, and 3, from the '775 Patent, claims 1, 4, 9, 16, 21, 29, and 36. In my opinion, I've found evidence to support that the infringing products infringe every one of these patents, every one of these claims in these two patents.
Q. Thank you, Doctor Wells.

MS. GRIFFITH: Pass the witness.

THE COURT: All right. Before we move to cross examination, we're going to break for lunch, ladies and gentlemen. Counsel for AT&T and Verizon [sic] will cross examine the witness after we return from lunch.

I'm going to ask you to take your notebooks with you to the jury room over the lunch break. Ms. Clendening should have your lunch there. Please follow all my instructions, including not to discuss the case with each other. And in approximately 45 minutes, give or take, we'll be back in here and continue with the trial.

The jury's excused for lunch at this time.

(Whereupon, the jury left the courtroom.)

THE COURT: The Court stands in recess.

(Lunch recess.)

THE COURT: Be seated, please.

Mr. Nelson, are you prepared to go forward with cross examination?

MR. NELSON: I am, Your Honor.

THE COURT: Mr. Dacus is at the podium which means he's probably got something to raise with the Court.

MR. DACUS: It will be very short, Your Honor.

Doctor Bazelon, the Plaintiff's damages expert, is going to testify this afternoon. I understand the Court's ruling regarding the lump sum, that he's allowed to testify about

that. I just wanted to say to the Court that I'll need to object and ask for a continuing objection on that issue. It's just for preservation. I don't intend to belabor it at all.

THE COURT: Ask to approach the bench and we'll do it at the bench when the time is right.

MR. DACUS: Yes, sir. Thank you.

THE COURT: Okay? All right.

Let's bring in the jury, please.

(Whereupon, the jury entered the courtroom.)

THE COURT: Welcome back from lunch, ladies and gentlemen. Please have a seat.

We'll proceed with cross examination of Dr. Jonathan Wells by Mr. Nelson on behalf of Defendant and Intervenor.

Counsel, please proceed with cross examination.

MR. NELSON: Thank you very much, Your Honor. May we have a moment just to pass the binders up?

THE COURT: You certainly may.

MR. NELSON: Thank you.

THE COURT: Proceed whenever you're ready, counsel.

CROSS EXAMINATION

BY MR. NELSON:

Q. Good afternoon, Doctor Wells.

A. Good afternoon.

Q. I'm David Nelson. We met a few years back. You may not remember. I was a younger man then. But it's very nice to

see you again.
A. And to you, sir.
Q. So I have a few questions for you.
First, let's start with the notion of infringement. You went through a number of elements, I think you called them, parts of the claim. Right?
A. Yes.
Q. So, for example --
MR. NELSON: Let's just put up PX 3, which is the '134 Patent and go to claim 1, please, which is there in column 28. It's column 28. It's the last -- well, not the last page. Probably the third to the last. There we go. And if you could just blow up claim 1, please, Mr. Horseman?
Q. (BY MR. NELSON) Okay. So let's just get some of this here because maybe we're not all familiar with it.
So a claim is actually written as one sentence. Right?
A. That's my understanding, yes.
Q. And each of the indented parts, sometimes we'll call those limitations. You're familiar with that term?
A. Yes, I am.
Q. And sometimes we call them elements. Are you familiar with that as well?
A. Sure, yes.
Q. But you're aware that you could have everything but one word missing so that you don't have one of the elements and

there's no infringement. Right?
A. That's right, yes.
Q. Okay. So the fact that you might have nine out of 10 isn't good enough for patent infringement. Right?
A. You have show every single one of these limitations is met.
Q. And -- and every word of those limitations is met. Correct?
A. That's correct.

MS. GRIFFITH: Objection. Plaintiff's MIL -- sorry, stipulated MIL 10.

THE COURT: I'm sorry. Restate your question.

MS. GRIFFITH: Objection, improper claim construction.

THE COURT: Approach the bench, counsel.

(The following was had outside the hearing of the jury.)

THE COURT: I'm not sure I understand the basis of your objection.

MS. GRIFFITH: Yes, Your Honor. The basis is asking whether every limitation is present and whether every element is present is one thing. Asking Doctor Wells whether every single word that's in the claim has to be there then is asking the jury to look to the words that are specifically on the page and not necessarily to Your Honor's constructions.

THE COURT: I understand that it's what caught your attention, but I don't know how that's improper claim construction.

MS. GRIFFITH: It sounds like it's giving a different legal instruction to the jury what they need to find for infringement.

THE COURT: Which, again, is not claim construction. I mean, I think you have a basis to object and I don't think that's a proper instruction, that every word from the claim has to be shown. I mean, that's why we have doctrine of equivalents.

MR. NELSON: And that's not what I was going for.

THE COURT: But that hasn't been clarified.

MR. NELSON: I can clarify that, Your Honor. That's no problem. That's not what I was going for.

THE COURT: All right. I'm going to overrule the objection that it's improper claim construction, but I am going to instruct counsel that the Court will instruct the jury on the law and what is required and not required. So -- and I do not view the precedent on infringement to require that every word of the claim be present or be shown to exist in the product to meet the element-by-element requirement.

But at this point I'm going to overrule the objection, but I expect you to go forward on the basis of that

instruction.

MR. NELSON: Understood, Your Honor.

THE COURT: All right.

(The following was had in the presence and hearing of the jury.)

THE COURT: Let's proceed.

Q. (BY MR. NELSON) So, Doctor Wells, when -- if we go to your slide 28 --

MR. NELSON: Oh, yours have different numbering. Those are the set that we got. I can tell you which one it is in that set. It would be 33.

Q. (BY MR. NELSON) So you recall that you talked briefly -- well, not briefly. You talked some about the abstract of the patent. Right?

A. Yes, I did.

Q. And so let's just set the stage a little bit. You have the specification of a patent. You talked about that?

A. Yes.

Q. And you know from His Honor's instructions that the specification describes the invention and how to do it and those sorts of things. Right?

A. Well, the invention is in the claims. The specification provides a written description of what the invention is about.

Q. Exactly. And the abstract, I think you said that describes what the invention is about as well. Right?

A. It's a summary at the front that describes the invention.
Q. Okay. So now here you highlighted a couple of things. But if we look at the last three sentences together where it picks up, "The receiver described herein samples the entire band in which there can be signals of interest or signals that can generate interference. All of these signals are sampled in one bit stream and the bit stream is processed to isolate signals of interest and interfering signals. The isolated interfering signals are then canceled out of the signals of interest." Do you see that?
A. Yes, I do.
Q. And you think that's a generally accurate description of what the patent's about. Right?
A. Well, the patent's defined is, the invention is defined by the claims. But this is a summary of what the written description is generally about.
Q. And you don't -- you were here for Mr. Smith's testimony yesterday. Right?
A. Yes, I was.
Q. And you're not disputing any of Mr. Smith's description of his invention, are you?
A. No, I'm not.
Q. So now let's talk about some of the elements of the claim.
MR. NELSON: And let's go back to claim 1, please,

Mr. Horseman.
Q. (BY MR. NELSON) And let's look at that first element. It says, "over-sampling at a desired frequency, a passband of received signals to create a bit stream." Okay? So let's stop there for a moment.
So here there is an oversampling, and you talked to us about that, of some bandwidth to create a bit stream of received signals. Do you agree with that.
A. Yes, I do.
Q. Okay. And then it tells us what that bit stream needs to include. Right? In the next part of this element.
A. No.
Q. So it says, "Wherein the received signals include signals of interest and interference generating signals, the interference generating signals capable of generating intermodulation products in-band of the signals of interest." Do you see that?
A. Yes, I do.
Q. And so that's what the received signals need to include. Right? All three of those things.
A. I think there's two things.
Q. Well, you have a signal of interest. Right? And you have interference generating signals. Correct?
A. Yes.
Q. And then those interference generating signals would be

the ones capable of generating the intermodulation products. Correct?
A. Yes.
Q. Okay. But what you're saying is that third thing wouldn't be in the bit stream.
A. Well, what this claim is saying is it's saying the received signals need to be two things. They need to be -- they need to include signals of interest and they need to include interference generating signals.
Q. Okay. And here the interference generating signals are the ones capable of generating intermodulation products in-band of the signals of interest. Correct?
A. Correct.
Q. Okay. So let's take those first two things, the signals of interest. So we have a construction from the Court, and this -- I've got to translate again. I believe it's your slide 50 -- you have 51. It's your slide 46. No. 51, please.
Okay. So here is the Court's claim construction of signal of interest. With respect to the receiver, a signal that the receiver is trying to receive and send in digital form to the base band processor. Do you see that?
A. Yes, I do.
Q. And the Court's construed that. So for signal of interest, that's the definition we all need to apply. Correct?

A. That is correct.
Q. So now if I go to your -- you have 43. It's your slide 38.
So -- and this, and this comes from PX 855. Do you recall discussing this?
A. Yes, I do.
Q. And we saw this quite a few times. It's a general overall behavioral architecture for the PIM-C feature. Correct?
A. Correct.
Q. Okay. So now we have -- you'll see in the Nahka ASIC, do you see that there?
A. Yes, I do.
Q. You understand that the Nahka ASIC is the base band processor for the radio. Correct? Or includes the base band processor for the radio. Correct?
A. It's a base band processor. It's not the only one.
Q. The Nahka ASIC includes the base band processor for the radio. Correct?
A. No, I wouldn't put it like that.
Q. So the block at the top, it says DL(TX), do you see that?
A. Yes, I do.
Q. So DL here stands for downlink. Correct?
A. Yes.
Q. And downlink is what the base station is trying to send

down to the phone. Correct?
A. That is correct.
Q. That's the terminology. So that's the information that's being transmitted from the base station to the phone. Correct?
A. That is correct.
Q. All right. And if we look at the box below, the UL(RX), so UL in this context stands for uplink. Right?
A. Yes.
Q. And uplink is the information that the phone is trying to send up to the base station. Correct?
A. Yes.
Q. Okay. And RX is a common abbreviation for receiver. Correct?
A. It is.
Q. Okay. So the Nahka ASIC has a block for a downlink transmitter and a block for an uplink receiver. Correct?
A. According to this figure, yes.
Q. Okay. And that's your understanding of how it actually works. Correct?
A. Yes. It has some functionality for the downlink transmitter and the uplink receiver.
Q. And if we -- I think the block, if we continue from the downlink transmitter all the way through the antenna -- do you see that?

A. Yes, I do.
Q. -- you call that the transmit block. Correct?
A. I don't know if I referred to it as a transmit block, but it's the transmit functionality of this overall architecture.
Q. The transmit path. It takes us from the Nahka ASIC all the way through the antenna. Correct?
A. That is correct.
Q. Okay. And now if we follow from the antenna through the duplexer down to the LNA, the filter amp, and the RF ADC, do you see that? I think it was the brown line in your testimony?
A. Yes, I do see that.
Q. And brown is a little bit hard to see. But the path there from the antenna through the front end duplexer, the LNA, the filter amp, the RF ADC, ultimately to the UL(RX), the uplink RX, that would be the receive path. Correct?
A. That would be part of the receive path.
Q. The -- so that contains the signal that the base station is actually trying to receive from the phone. Correct?
A. That contains the uplink.
Q. And we already established, didn't we, that the uplink is the signal that the phone is trying to send to the base station? Correct?
A. Yes.
Q. Okay. So the uplink path that's shown here would include

the signal that the phone is sending to the base station. Correct?

A. Yes, it would.

Q. Okay. Now, if we go to your slide 47, which I think is 52 in your deck. Now, on this slide 52, you were marking what you believe to be the signal of interest in the accused Nokia radios. Correct?

A. Yes.

Q. Okay. And you identified that signal of interest as the downlink transmit signal. Correct?

A. No. I identified it as the downlink transmit reference signal.

Q. The downlink reference transmit signal, meaning the one that split from the transmit path. Correct?

A. And fed back to the receiver.

Q. Okay. So that a -- I think you said a copy of the transmit signal. Correct?

A. Yes.

Q. So the copy of the transmit signal is what you identified to be the signal of interest in the accused products. Correct?

A. I did because it meets the Court's definition of signal of interest.

MR. NELSON: Your Honor, may I use the flip chart?

THE COURT: You may.

And if you'd like to bring it up equal with the elmo so the jury can see it, that's how it's typically used.

MR. NELSON: I appreciate that, Your Honor.

THE COURT: And, Doctor Wells, if you can't see what he writes on there, you are welcome to stand if necessary so you can see it.

THE WITNESS: Thank you, Your Honor.

THE COURT: You have to bring your own markers, apparently.

Q. (BY MR. NELSON) Okay. So I just want to go through and try to chart what it is that you're identifying as various things in the claim. Is that okay?

A. Yes, sure.

Q. So here I've written the signal of interest. And my handwriting is not the best. I apologize for that. You've identified as a copy of the transmit signal. Correct?

A. I've identified the downlink TX reference signal as a signal of interest.

Q. Which is, as we -- is a copy of the transmit signal. Correct?

A. It's a copy of the receive signal. I beg your pardon. It's a copy of the transmit signal that's fed back to the receiver.

Q. Then I'll add that part. Okay. So under your infringement theory, the signal of interest is the copy of the

transmit signal that's fed back to the GROOT FPGA. Correct?

A. Back to the receiver, yes.

Q. And -- well, in your opinion there, what you're calling the receiver is the GROOT FPGA. Correct?

A. No.

Q. You're calling the -- in the GROOT FPGA, the copy of the transmit signal is fed back into the PIM adaptive model block. Correct?

A. It's being fed back into the receiver, which includes the GROOT FPGA amongst other things.

Q. The receiver includes the GROOT FPGA. So you're saying the GROOT FPGA is part of the Nahka ASIC. Is that your testimony?

A. No, not at all.

Q. Okay. So you agree with me, though, that you've identified the signal of interest as a copy of the transmit signal that's fed back. Correct?

A. Fed back to the receiver. Maybe you could add to the receiver to your definition.

Q. You'll agree with me that that copy of the transmit signal is not fed back to the Nahka ASIC. Correct?

A. I mean, I didn't analyze that it was. It's not shown to be that way in this figure.

Q. Okay. And you have no information that it is. Correct?

A. I -- I haven't, no.

Q. Okay. So now I want to talk about in the claim what you identify to be the interference generating signal. Okay?
A. Yes.
Q. Okay. And the interference generating signal was the second thing that needed to be identified in the received signals. Correct?
A. Correct.
Q. Okay. So the -- what you identified -- and if we can go to your slide 49, which I believe is 54.
So here you identified the modeled PIM path to be the interference generating signals capable of generating intermodulation products in-band of the signal of interest. Correct?
A. Yes, I did.
Q. So here I've written the information -- or the interference generating signal equals the modeled PIM path. That's fair?
A. Yes, that's what you've written.
Q. Okay. And that's what you have identified as the interference generating signal in the accused product. Correct?
A. That's right, yes. It's the second signal in that red path.
Q. Now, let's talk about that a little bit. So before the RF ADC that's shown there, now the RF ADC, that's a radio

frequency analog-to-digital converter. Correct?
A. Correct.
Q. Are you familiar with the terms upstream and downstream?
A. Yes.
Q. Okay. So just like a river, if it's the opposite of the direction of the current flow, it's upstream, and in the direction of the current flow, it's downstream. Right?
A. Okay.
Q. Is that -- that's correct -- consistent with your understanding. Right?
A. Yes.
Q. So then upstream of the RF ADC, before the copy of the transmit signal gets to the RF ADC, there is no modeled PIM on that signal, is there?
A. Well, there's -- there's two signals on that red path because we know that because there's the x1 and the x2.
Q. Correct. The x1 and the x2 are the two transmit signals. Correct?
A. This legend says that there's the -- two signals are the downlink TX reference and the modeled PIM path.
Q. But you see the block downstream of the radio frequency ADC that says, PIM adaptive model that's in the GROOT FPGA? Correct?
A. Yes, I see that.
Q. And it's in that block where the PIM model is generated.

Correct?
A. Yes, it is.
Q. Okay. So now, back to my question, upstream of the RF analog-to-digital converter, there's no modeled PIM signal included with the copy of the transmit signal. Correct?
A. There's two signals in that red path. The legend says one of them is the downlink TX reference and the other is the modeled PIM path. So I pointed to that second signal as the interference generating signal.
Q. So I'll try this. The RF ADC does not convert from analog-to-digital a modeled PIM path. Correct?
A. It converts the two signals coming into it, which are the interference generating signal and the signal of interest.
Q. The -- well, the signal of interest you called a copy of the transmit signal. Correct?
A. Well, I call it the DL(TX) reference. I think that's what you're calling it.
Q. Okay. The DL(TX) reference signal. That includes both transmit signals. Right? X1 and X2?
A. Well, this figure is saying that the red path is the downlink TX reference and the modeled PIM path. It's the two signals.
Q. And the PIM is modeled after the radio frequency analog-to-digital converter. Correct?
A. Yes.

Q. Okay. So then, again, to my question, upstream of the RF analog-to-digital converter, in other words, when the signal is still analog, there is no modeled PIM signal that's being fed into the RF ADC. Correct?
A. Well, this figure is saying that there's the red path is two figured -- two signals, one of which is the modeled PIM path.
Q. The two signals are the transmit signals. Correct? The two transmit signals.
A. Well, according to this figure, it's the downlink TX reference and the modeled PIM path.
Q. So now if we look at your slide -- it's 64 in yours and it's 58, I believe.
So -- no, excuse me. I said that wrong. No, this is -- this is good. This is exactly what I want. I'm sorry.
So now you say the red path includes the signal of interest and the interference generating signals and the source signals. Correct?
A. No, that's not what this slide says. This says that the interference generating signal is also the source signal.
Q. Understood. So the interference generating signal is the same as the source signal. Correct?
A. Yes.
Q. And that's true in the claims. Correct?
A. Yes.

Q. Okay. And the Court's definition of source signal is the signals that mix in the non-linearities to produce intermodulation products that fall in-band of the signal of interest. Correct?
A. I don't have it in front of me. That sounds correct.
MR. NELSON: Do you have the constructions?
May I have the document camera, please?
Q. (BY MR. NELSON) And here I believe is the same chart that's in the juror notebooks.
You'll see where it says source signals, signals that mix in the non-linearities to produce intermodulation products that fall in-band of the signal of interest. Do you see that?
A. Yes, I do.
Q. Okay. So we've established that upstream, in other words, when the signal is still analog, that transmit signal includes copies of the two transmit signals. Correct?
A. Can you say that one more time, please?
Q. Sure. So the signal of interest you identified to be the copy of the transmit signals that are fed back. Correct?
A. Yes.
Q. Okay. Now the source signals you're identifying as the transmit signals. Correct?
A. It's the other signal that's in this red path.
Q. The transmit signals.
A. Well, it's labeled here as the modeled PIM path.

Q. Well, but you said the modeled PIM path was the interfering signal. Correct?
A. The interference generating signal.
Q. Well, you understand that the PIM is the -- if we go back to the Court's claim construction, the PIM is the result. Right? That's the intermodulation products. Do you agree that's the PIM?
A. Yes, I do.
Q. Okay. And that's -- the signal that results from mixing of jammer signals in the non-linearities of the system that result in generating interfering signals in the passband of the signal of interest. Do you see that?
A. Yes, I do.
Q. So the intermodulation products are the product of the interference signals. Correct?
A. Yes.
Q. So, in other words, it's the interference signals that generate the intermodulation products. Correct?
A. Yes.
Q. So the interference signals are not themselves the intermodulation products. Correct?
A. That's true.
Q. Okay. And the source signals in the patent are the same as the interference generating signals. Correct?
A. They are, yes.

Q. Okay. So the source signals then cannot be the results of the interference generating signals. Correct?
A. I think that's fair, yes.
Q. So, in other words, the source signals can't be the PIM.
A. The source signals -- yes, I would agree with that.
Q. Okay. So the source signals cannot be the PIM. Correct?
A. Yes, I would agree with that.
Q. Okay.
MR. NELSON: Now, if we go back to the slide that we just had up -- and go back to the previous one.
Q. (BY MR. NELSON) So this is your slide 64. You say that the source signals here are the modeled PIM. Correct?
A. It's what's labeled in that diagram as the modeled PIM path.
Q. Yeah. But -- so what you're saying is that the modeled PIM, which is not on the line upstream of the RF ADC, is the source signal. Correct?
A. That's not what I'm saying, no.
Q. Okay. All right. So you understand that for the purposes of these claims, we have to clearly identify -- in order to show infringement, you have to clearly identify what each of the elements are. You understand that. Right?
A. Yes, I do.
Q. Okay. Now, so we've established here that the signal of interest in your infringement contention is a copy of the

transmit signal that is fed back to the receiver. Right?
A. Yes.
Q. And that transmit signal includes x1 and x2, in other words, the two signals transmitted. Correct?
A. No, I haven't said that.
Q. Well, what I'm saying is the copy of the transmit signal includes the two signals transmitted. Correct?
A. Well, I hate to be picky. Your question, is it correct you said that, yes, you said that, but that's not my opinion.
Q. Let me ask it again. So in the -- I'm focusing on the red path before the RF ADC. Okay? In your slide 64.
A. Yes.
Q. Okay. And you understand that what we're trying to identify for purposes of the claim are specific signals. You understand that?
A. Yes.
Q. Okay. So we've established that the red path before the RF analog-to-digital converter includes a copy of the two transmit signals. Correct?
A. It includes the downlink TX reference.
Q. Right. The downlink TX reference is a copy of the two transmit signals. Correct?
A. It's a copy of the transmit signal, the output of the transmitter.
Q. Right. Which includes the two frequencies that are

transmitted. Correct?
A. It could do.
Q. Okay. So it includes a copy of the output of the transmitter. So, in other words, the signal being transmitted.
A. Yes.
Q. Okay. But you identify the interference generating signal as the modeled PIM path? Correct?
A. Yes, that's right. The second path on that red path -- the second signal on that red path.
Q. Okay. So the modeled PIM path is not a signal. Correct?
A. Well, according to this slide, the red path is the downlink TX reference and the modeled PIM path.
Q. Okay. Well, let's go back to your slide 64, which is slide 70, I believe, in your...
So here is the -- you talked about this several times, but this is the non-linear block. Correct?
A. Yes, it is.
Q. Okay. And this would be something that's inside the GROOT FPGA. Correct?
A. Yes, it is.
Q. Okay. And if you blow up all the way to the left there, you'll see there are two signals that are input, x1 and x2. Correct?
A. Yes, correct.

Q. Okay. And those two signals are from the signals that are being transmitted. In other words, the output of the transmitter. Correct?
A. They're from the -- well, actually they're from that RF ADC.
Q. So they are digital copies of the output of the transmitter. Correct?
A. From that red path, yes.
Q. Okay. So then the only thing that goes into the non-linear block are the digital representations of the two transmit signals. Correct?
A. The two signals that are on that red path.
Q. Right. Which are the transmit signals.
A. Which are labeled the TX -- I beg your pardon, the downlink TX reference and modeled PIM path.
Q. Okay. So you're saying that x1 is the modeled PIM path?
A. I'm saying that x1 and x2 are the two inputs here that are represented by those two signals that are on the red path.
Q. So -- well, here if we just look at the top of the slide, the element that you were talking about when you showed slide 70, it says, "computing an estimate of each of the one or more intermodulation products from the source signals that generate the one or more intermodulation products." Correct?
A. Yes.
Q. Okay. So the block you've pointed to, the non-linear

block, is what you say calculates the PIM or estimates the PIM. Correct?
A. Yes, it does.
Q. Okay. Now, if we go back to the previous slide, your slide 58, there is no modeled PIM until the signal reaches the block, the non-linear block that we just looked at, which is within the GROOT FPGA. Correct?
A. That's where the PIM model is generated.
Q. Okay. So then if that's where the PIM model is generated, it's accurate to say that before that, in other words, upstream of that, that signal is not present. Correct?
A. The estimates of the PIM model are not, but there is this red path that we know has two signals on it.
Q. Right. But the RF ADC only converts from analog-to-digital the transmit signals x1 and x2. Correct?
A. Yes.
Q. Now, you'll agree with me that something can't both be for purposes of the '134 patent claims the interference generating signal and the interference itself. Correct?
A. Yes, I would agree with that.
Q. Okay. Those have to be two different things. Correct?
A. I don't know if they have to be. But, yes, I mean generally they would be different.
Q. So now I want to switch gears a little bit and talk about the '775 Patent.

Actually before I do that, let me just ask you this. So you'll agree with me that the -- and let's put it back up, that first element of claim 1 of the '134 Patent that we looked at earlier, and when you went through your infringement analysis, I believe what you said is that that same element is found in claims 2 and 3. Correct?
A. The function that's described in that limitation is found in claims 2 and 3.
Q. Exactly. And thank you for that.
So that function is there. And so if the jury were to find that the function of the first element of claim 1 actually isn't in the products, then claims 2 or 3 wouldn't be infringed as well. Right?
A. So that would be true. I mean, I believe this is in the products. But if the jury was to find that it wasn't, then it's not in the product.
Q. All I'm getting at is we looked at claim 1 with respect to the function of creating a bit stream that includes the signals of interest and the interference generating signals. Right?
A. Yes, we did.
Q. And so that same function appears in claims 2 and 3 of the '134 Patent. Correct?
A. Yes, it does.
Q. And so if the jury were to find that the function of

creating a bit stream that includes both the signals of interest and the interference generating signals is not found with respect to claim 1, that would mean claims 2 and 3 aren't infringed as well. Correct?
A. That would be true.
Q. So now I want to talk about the '775 Patent for a moment.
MR. NELSON: And if we could pull up PX 4. And if we look at claim 1, which starts in column 16 and goes to column 17. Perfect.
Q. (BY MR. NELSON) Okay. So you walked us through claim 1. Do you recall that on your direct testimony?
A. Yes, I do.
Q. Okay. And I want to focus in on the last part of the claim where it says, given three signals, S1, S2, and S3, digitally multiplying and filtering S1 times S1 times S2 -- and there are seven multiplications there. Correct?
A. Yes, there are.
Q. Okay. And so you'll agree with me that in order to infringe claim 1, you need to have both three signals and these seven multiplications. Correct?
A. Correct.
Q. Okay. So those all need to be there in the product. Correct?
A. Yes.
Q. Okay. Now, with respect to the other asserted claims

that you went through, which are 4, 9, 16, 21, 29, and 36. Correct?
A. I believe so, yes.
Q. And so the same limitation of, given three signals, S1 S2 and S3, digitally multiplying and filtering and having the seven specific multiplications, that's in all the claims. Correct?
A. Yes, it is.
Q. So if the jury were to find that that isn't present, that the accused products don't have three signals and the seven multiplications, then none of the claims of the '775 would be infringed. Correct?
A. That would be true.
Q. So I would like to go now to your slide 163 --
MR. NELSON: -- which will be 169 in your deck, Mr. Horseman.
Q. (BY MR. NELSON) And I apologize for that. I was just -- the copies that we got, the numbering changed a little bit. That's the reason for it.
THE COURT: No need to apologize or to have a big discussion. Let's just get the right slide on the screen.
MR. NELSON: Yep.
Q. (BY MR. NELSON) So now here we're looking at the -- your mapping of the -- the element that we just looked at. Correct?

A. Yes.
Q. Where it says, given three signals, S1, S2, S3, digitally multiplying and filtering, and then there's seven different multiplications there. Right?
A. Yes, there are.
Q. And you'll agree with me that if we looked at those seven multiplications, none of them repeat. Correct?
A. Are you talking about the claim language or the --
Q. In the claim. Yes, in the claim language.
A. In the claim language, correct.
Q. Right. So I have -- if I looked at the first one, S1 times S1 times S2 and then looked at the other six, I wouldn't see it again. Correct?
A. That is correct.
Q. And that's true for each of the other six. Correct?
A. Yes.
Q. So now here you have a mapping, and you agree in the accused product we just looked at the non-linear block, there are two signals input, x1 and x2. Correct?
A. Correct.
Q. And so what you do is you say x1 is equal to S1. Right?
A. In this example mapping that I've put up here, yes.
Q. And x2 is equal to both S2 and S3. Right?
A. Correct.
Q. And so you take two signals and map it to three.

Correct?
A. I take two signals, and I map it to the three signals that are in the claim.
Q. Right. So, in other words, x2 is both S2 and S3. Correct?
A. In this example, S2 is equal to x2, and S3 is also equal to x2.
Q. Right. So the same -- you have one input signal, x2, but you map it to the same signals in the claim S2 and S3. Correct?
A. Yes, I do.
MS. GRIFFITH: Objection, rearguing claim construction.
THE COURT: Overruled.
Q. (BY MR. NELSON) And this -- just so we're clear on your slide 169, that's the example that you gave to the jury for why the element was met in the products. Correct?
A. That's -- that's an example mapping of how it can be met in the products.
Q. Right. In terms of your -- your testimony today on direct, that's the mapping you provided. Correct?
A. Yes, it is.
Q. Okay. So now if we look at -- below that, you take the mapping that you made where you say x1 is equal to S1 and x2 is equal to S2 and S3, you map that to the seven

multiplications. Correct?

A. Yes, I do.

Q. And now when you do that, several of them repeat. Correct?

A. Yes, they do.

Q. Okay. And, in fact, if you go through, you take seven -- there were seven different multiplications. We established that. That's what's required by the claim. Correct?

A. Yes.

Q. And now you only have three different multiplications. Correct?

A. I have three multiplications -- well, I still have seven multiplications, but it results in three different separately identifiable multiplications on the right.

Q. Right. So, in other words, if I look at the claim requires S1 times S2 times is S2. Right?

A. Yes, it does.

Q. And that one you mapped to x1 times x1 times x2. Correct?

A. I think either you may have misspoke or I may have misheard. So could you say that one more time?

Q. Yeah. I was just taking the first one that you highlighted. With the mapping of x1 is equal to S1, and x2 is equal to S2 and S3, the first multiplication in the claim is S1 times S1 times S2. Do you see that?

A. Yes, I do.
Q. And in your mapping, that results in x1 times x1 times x2. Correct?
A. Correct.
Q. And if we look down to the fourth one, the claim requires S1 times S1 times S3. Correct?
A. Yes, it does.
Q. And your mapping results in, once again, x1 times x1 times x2. Correct?
A. Yes.
Q. Okay. And we could go through that with a few of the others, but that's why the seven different ones in the claim, you've now mapped to only three different ones. Correct?
A. The seven are still present, but they show themselves as three multiplications in the mapping.
Q. Right, because multiple of them repeat, they are the same. Correct?
A. They result in the same answer.
Q. So you'll agree with me that three different ones is not seven different ones. Correct?
A. Not as it pertains to this slide, no. I mean...
Q. How about this then? Three is not the same as seven. Correct?
A. I would agree with that.
Q. Okay. And how about this? So you take -- and we can put

up the Court's claim construction, which we should do, of three signals. And this -- oh, let me --

MR. NELSON: Excuse me. Can I have the document camera, please?

Can everybody see that?

THE COURT: The wheel on top adjusts.

MR. NELSON: Oh, thank you, Your Honor.

Q. (BY MR. NELSON) So here it says three signals, S1 and S2. Right? Do you see that?

A. Again, counsel, I think you've misread it slightly.

Q. Oh, I'm sorry. Let me do it again. I didn't intend to. So three signals, S1, S2 and S3. Right? That's the term?

A. There's three there.

Q. Right. And the Court's construction is signals which must be separately identifiable but are not limited to three unique input signals. Do you see that?

A. Yes, I do.

Q. All right. So, now, let's say I owe you $3. Okay?

A. Okay.

Q. Now, if I give you $1 and then I give you the second dollar and I say count that one twice, I still owe you a dollar, don't I?

A. In this hypothetical that you've just proposed to me, yes.

Q. Because I don't have three separately identifiable

dollars. Correct?
A. Well, in this hypothetical, yes.
Q. Right. I don't have three separately identifiable dollars. Correct?
A. In this hypothetical, yes.
Q. Right. And those dollars, they are all the same -- they're not unique. They're all $1 bills. Right?
A. They are unique, I would say, because they have serial numbers on them.
Q. Okay. So now if I had three, I could give you $3, and I wouldn't be -- I wouldn't owe you a dollar anymore. Right?
A. If you owed me $3 and you gave me $3, you wouldn't owe me any money.
Q. Right. So the claim requires signals which must be separately identifiable but are not limited to three unique input signals. Do you see that --
A. Yes, I do.
Q. Okay. And if we go back to your mapping, which is your slide 163 [sic], the one we were just looking at --
MR. NELSON: Thank you.
Q. (BY MR. NELSON) -- you map two signals to three. Correct?
A. I map the S1 and the S2 and the S3, three identifiable signals, to the two inputs, x1 and x2.
Q. Right. So x2 becomes both S2 and S3. Correct?

A. Yes. Separately it becomes S2, and separately from that, it becomes S3.

Q. And I thank you for your time, sir. And I have no further questions for you right now.

A. Thank you, sir.

MR. NELSON: And I pass the witness, Your Honor.

THE COURT: Is there redirect by the Plaintiff?

MS. GRIFFITH: Yes, Your Honor. Short.

THE COURT: Proceed with redirect.

And you need to put the chart back where it was --

MR. NELSON: Yes, sir.

THE COURT: -- Mr. Nelson, and turn it to a clean sheet, please.

Thank you.

MR NELSON: Thank you, Your Honor.

THE COURT: All right, Ms. Griffith. Please proceed with redirect.

MS. GRIFFITH: Thank you, Your Honor.

Mr. Boles, could you please bring up the claim construction again with S1, S2, and S3?

REDIRECT EXAMINATION

BY MS. GRIFFITH:

Q. And, Doctor Wells, do you recall Mr. Nelson asking you about if you had $3 that were owed to you and he told you to count one of them twice, you didn't really receive $3? Right?

A. Yes, that's right.
Q. What if somebody said that you had to hand over three $1 bills, but they did not have to be three unique dollar bills?
A. I'm not really following this hypothetical. I'm sorry.
Q. No, no, no. That's fine.
If the -- I think that what I'd like to focus on is the end of this construction, it mentions three unique input signals. If there are three unique input signals required, did you interpret that to require that there needs to be an x1, x2, and x3.
A. I'm sorry, can you say it one more time? If there was three required?
Q. Yes. But they need not be -- they're not limited to unique signals.
A. If there was -- if it required three unique signals, that would be x1, x2, and x3.
Q. And if they are not required to be, if they're not limited to unique signals?
A. Then it doesn't have to be three unique signals. You can have x1 by itself, you could have x1 and x2 as well, as long as they yield three separately identifiable signals, S1, S2, and S3.
Q. Thank you.
MS. GRIFFITH: Mr. Boles, you can take that down.
Q. (BY MS. GRIFFITH) I'd also like to ask, during the

discussion about '134 Patent, do you recall Mr. Nelson using the terms downstream and upstream?

A. Yes, I do.

Q. Are those the same thing as downlink and uplink?

A. No, they're not. They're different.

MS. GRIFFITH: And, Mr. Boles, could you please bring up PX 855 on page 1968? And blow the figure 1 up.

Q. (BY MS. GRIFFITH) So I'd like to discuss this figure now if you don't mind.

Where in this diagram of figure 1 does the cancellation occur?

A. So the cancellation occurs in the circle in the middle of the GROOT FPGA. It's the circle with the minus sign in it.

Q. And do you see two arrows, one pointing down and one pointing up at the subtraction?

A. Yes, I do.

Q. What is the red arrow coming down to the subtractor?

A. So that's the estimates of the interference model.

Q. And how does GROOT generate or what does GROOT use to generate the estimates of the intermodulation signal?

A. So that's the non-linear block that's inside the GROOT FPGA.

MS. GRIFFITH: And, Mr. Boles, could we please go to page 1963 in this document? And if you could zoom on in the paragraph on what PIM cancellation means. Thank you.

Q. (BY MS. GRIFFITH) Doctor Wells, do you see that the first sentence in this paragraph references a modeled/reference PIM signal?
A. Yes, I do.
Q. How does the Nokia document state that this modeled/reference PIM signal is obtained?
A. It's obtained from the combined carrier transmit signal and it's subtracted then from the uplink signal.
Q. And when that occurs, it's subtracted from the received uplink signal, what happens for purposes of GROOT?
A. Then the interference is canceled.
Q. Thank you for your time.
MS. GRIFFITH: Pass the witness.
THE WITNESS: Thank you.
THE COURT: Is there additional cross-examination?
MR. NELSON: No, sir, Your Honor.
THE COURT: Then you may step down, Doctor Wells.
THE WITNESS: Thank you, Your Honor.
THE COURT: You're welcome.
Plaintiff, call your next witness, please.
MS. FAIR: At this time the Plaintiff calls Dr. Coleman Bazelon.
THE COURT: All right. Doctor Bazelon, if you'll come forward and be sworn, please.
(Whereupon, the oath was administered by the Clerk.)

THE COURT: Thank you, sir. Please come around and have a seat on the witness stand.

MS. FAIR: And, Your Honor, I've handed a copy of the slides to Defense counsel. Would the Court like some copies?

THE COURT: That's fine.

All right. Ms. Fair, you may proceed with the direct examination when you're ready.

MS. FAIR: Thank you, Your Honor.

Ms. Brunson, if we may have the slides, please. Thank you.

COLEMAN BAZELON, Ph.D., SWORN,

testified under oath as follows:

DIRECT EXAMINATION

By Ms. Fair:

Q. Good afternoon.

A. Good afternoon.

Q. Would you introduce yourself to the jury, please.

A. My name is Coleman Bazelon.

Q. What do you do for a living?

A. I'm an economic consultant.

Q. What does an economic consultant do?

A. It's when economists apply their education and trade to answer questions from clients.

Q. Do you have any areas that you specialize in?

A. Much of my career has been in the telecommunications area. I also co-chair Brattle's IP practice, and I have a budding sports practice.
Q. What were you asked to do in this case?
A. Calculate the damages for the two -- infringement of the two patents at issue.
Q. And before we get too deep into your analysis, can you tell us a little bit about yourself? Do you have a family? Are you married?
A. I am married 30 years this fall. I have two sons. My younger son is in college. My older son is apprenticing to be an electrician.
Q. Now, what makes you qualified to do the type of analysis that's required to assess damages in a case like this?
A. I think it's both my education and my experience.
Q. Can you tell us where you went to school?
A. I have an undergraduate from Wesleyan University, I have a diploma in economics from the London School of Economics, and I have a Master's and a Ph.D. in economics from the University of California at Berkeley.
Q. Was it quick to get all those degrees?
A. I stayed more or less in school till I was almost 30.
Q. And what did you do when you graduated?
A. My first job was at the Congressional Budget Office.
Q. And, by the way, when you did get interested in

economics? Did you always want to do that?
A. No. I started off more interested in the government and political science. I was always interested in how society organized itself but realized that economics explained that more than politics did.
Q. What did you do in the Congressional Budget Office when you got hired there?
A. They hired me to estimate receipts to the federal government from auctions of radio spectrum licenses.
Q. What time period were you there?
A. '95 to 2001.
Q. And we heard Doctor Wells tell us that in the mid 1990s, the cellular industry was just budding. That's when you were at the Congressional Budget Office?
A. Yes. The first auction of these licenses was in 1994, and I got there just after that.
Q. And, by the way, what are these auctions you're talking about?
A. Well, we've heard and we see the colorful spectrum chart. We've heard that carriers such as AT&T use licensed radio spectrum. They're given specific swaths of it. The Federal Communications Commission is the one that gives out those licenses. And for the last 30 years almost, they've been giving them out by auction.
Q. What was it like being there at the Congressional Budget

Office right when this was starting out?
A. It was a lot of fun. This was right when the licensed spectrum auctions were starting, so we had to figure out how to value spectrum and what the implications of these auctions were going to be on the cellular industry.
Q. You told us you left around what? 2001 was it?
A. Summer of 2001.
Q. And where did you go after the Congressional Budget Office?
A. I went to a consulting firm called The Analysis Group.
Q. What type of work were you doing there?
A. I was hired to help them build out their telecommunications practice. I worked at that point in my career supporting other more senior people. In particular, I was supporting an academic who was specialized in telecommunications.
I also supported other partners at The Analysis Group, including the head of their intellectual property practice out of their Washington office.
Q. What sorts of projects were you working on there in the telecommunications space?
A. Well, the kinds of things we worked on were -- we would write white papers that would get submitted at the Federal Communications Commission so as part of regulatory proceedings, we would do work in litigation such as this one,

and we would support bidders in spectrum auctions.

Q. What specifically would have been your role or was your role when you were supporting bidders in these spectrum auctions that you had kind of worked on the other side of?

A. Well, when I worked for a bidder, I do a number of things to sort of soup-to-nuts support. It starts with helping them understand the value of the spectrum that's going to be auctioned and how that spectrum fits into their business model and how they should value it.

I helped them practice for the auction, would do dry runs, develop strategies. I help them set up their actual war room. So these are week-long, many week auctions you submit your bids over the internet. So we'd set up a room with computers, I'd make sure that they had internet, back-up internet, back-up to the back-up internet.

And then I would sit with them during the auctions round by round and help them evaluate the information that came out of a round and figure out what the best bid was for them to place in the subsequent round.

Q. And have you continued doing the same type of work at the Brattle Group?

A. Yes. When I came to the Brattle Group in 2007 as a principal, I did the same work except I was at a point in my career where I was transitioning where I was the senior person on the teams.

Q. Is part of your work also writing papers and publications in telecommunications economics?
A. It is. I write quite a bit about telecommunications economics.
Q. Do you have any papers specifically in spectrum valuation?
A. I have a number of them. One in particular is called Spectrum Value, and it was the first-peer reviewed publication on how to value spectrum.
Q. Were you also asked to present at various conferences and industry groups on telecommunications economics and spectrum valuation?
A. I am asked to speak quite often. I speak at seminars, at industry groups. And, for example, last summer the U.S. Senate Commerce Committee asked me to come and testify about the future of radio spectrum.
Q. Having had all of this experience in the industry, do you do this work for free?
A. Most of it not for free.
Q. What does Brattle charge for your time?
A. Brattle charges my clients $775 an hour for my time.
Q. And is that the same rate that you're charging in this case?
A. It is.
MS. FAIR: Your Honor, at this time the Plaintiff

offers Dr. Coleman Bazelon as an expert in telecommunications economics and spectrum valuation.

THE COURT: Is there objection?

MR. DACUS: No objection, Your Honor.

THE COURT: Without objection, the Court will recognize this witness as an expert in those designated fields.

Please continue.

Q. (BY MS. FAIR) Doctor Bazelon, what materials did you have that you reviewed and considered in putting together your analysis of damages in this case?

A. Well, I had access to a number of different information sources. There was numerous documents produced by the parties in this matter. I reviewed witness testimony, relied in particular on Doctor Wells, who you just heard.

I also -- my team and I did research at public -- from public sources such as the Federal Communications Commission. For example, their auction results.

I used academic texts to help inform parts of my analyses, and we also garnered information from the public press.

Q. And are these sorts of materials similar to what you would normally rely on in performing telecommunications economics valuations in the telecommunications space?

A. Yes.

Q. Were you able to reach a conclusion here as to the damages that would be owed for infringement?
A. I was.
Q. And we heard Mr. Ward and Mr. Grinstein tell us yesterday it's up to $166 million?
MR. DACUS: Your Honor, can we approach?
THE COURT: You may approach.
(The following was had outside the hearing of the jury.)
THE COURT: Yes, Mr. Dacus.
MR. DACUS: I apologize for interrupting, counsel, but I didn't want to be late on my objection.
Your Honor, we are about to get into the issue of the lump sum royalty amount that we had a discussion in chambers about. We object to that, to this witness putting on any testimony related to a lump sum amount, in particular the $166 million amount.
I understand that the Court has overruled our objection, but I need to make that for purposes of the record.
THE COURT: Well, for purposes of the record and based on our prior discussion in chambers, I overrule your objection.
I believe that paragraph 127, as a part of his report, establishes fair notice of his opinions on lump sum and is a basis by which Plaintiff can properly go into this. That

provision survived the ability to be challenged under *Daubert* during pretrial, it's properly in his report, and I think that supports the decision to overrule your objection, and I overrule it.

MR. DACUS: Your Honor, may we have a running objection so I don't need to get on my feet.

THE COURT: Yes, you may. Let's continue.

MS. FAIR: Yes, Your Honor.

(The following was had in the presence and hearing of the jury.)

THE COURT: Let's proceed.

MS. FAIR: Yes, Your Honor.

Q. (BY MS. FAIR) You heard yesterday Mr. Ward and Mr. Grinstein say that the damages could be up to $166 million.

Can you tell us just at a high level what conclusions you reached about what the damages would be in this case under various scenarios of infringement findings the jury would make?

A. I was asked to look at it under a couple of different scenarios. So one was whether or not the one or the other or both of the patents were found valid and infringed.

So the top bar deals with the situation where just the '134 Patent is found valid and infringed. The bottom bar deals with where either the '775 or the '775 and the '135 [sic] are found valid and infringed.

And I was also asked to calculate damages through the date of this trial today -- actually last week and then through the end of the patents.

Q. And what are your damages calculations based on here?

A. A per radio -- a royalty rate per radio per year of infringement. You can see the 272 for the -- associated with the '134 patent and the 251 per radio per year of infringement for the '775 Patent.

Q. Are both of these rows cumulative? So I see the first row is labeled where the '134 Patent expires and the second where the '775 expires. If both are infringed, can you tell us, do we add the two together?

A. You don't. If both are infringed, we use the bottom row.

Q. And if just the '775 is infringed, we use?

A. We still use the bottom row. It's really determined by the length of coverage of time of exclusivity from the patent. One or other patent is needed to practice the -- to use the infringing technology.

Q. So where did you -- to get to these numbers -- let's start at the beginning and work our way through. Where did you start?

A. Well, we always start by going back to the law that tells us that, when somebody's patent is infringed, they're entitled to at least a reasonable royalty for the use made of the invention by the infringer.

Q. Now, why did you underline for the use made of the invention by the infringer?
A. Well, I wanted to emphasize that a reasonable -- the reasonable royalty is only supposed to compensate the inventor for the actual use of their invention by the infringer.
Q. How do you go about doing this analysis? What framework is there?
A. Well, there is plenty of legal precedents about how to do these analyses, and we are guided to use a hypothetical negotiation to figure out what that royalty rate should have been.
Q. What is a hypothetical negotiation?
A. Well, it's one that's not actually real. It's as if the two parties sat down and had negotiated a royalty rate.
Q. I mean, if the parties are here in a lawsuit, clearly can't agree, how do you go about getting to what the result of a hypothetical negotiation would be?
A. Well, we're directed to assume that if the patents are found valid and infringed, the construct for the royalty is imagine had the parties with that knowledge that the patents were valid and that one of the parties was going to use them, go back to just before the first time they used the intellectual property and imagine the negotiation they would have had then to come to a price to pay for the use of the intellectual property.

Q. And is this assumption that when they're sitting at this table, there is, in fact, infringement and the patent is in fact valid? Is that something that's part of your version of the hypothetical negotiation? Where does that come from?
A. That's the legal direction that's given in calculating damages, that you imagine if, instead of ending up in court in 2023, they have recognized that it would have been valid and infringed, if before this all began, they had sat down and negotiated a royalty, what would they have negotiated with that knowledge.
Q. And I see you've got 2018 here on the bottom. What's that date?
A. That's when this hypothetical negotiation would have happened. The first use of the accused radios happened in early 2018.
Q. What factors are there to consider when you're going through the hypothetical negotiation exercise?
A. Well, again, there's more guidance from previous court cases, and there's a famous one called *Georgia-Pacific* where the Court lays out 15 different factors that damages experts should consider when they come up with a reasonable royalty analysis. And they're listed here and divided into two buckets.
Q. I see you've got no adjustment needed and embedded in analysis. Why were some of them not requiring adjustment in

this case?
A. They were factors that did -- that I considered but I didn't think affected my analysis of the royalty, so I could set those aside. The other set of factors are ones that were folded into the analysis that I did.
Q. Are you going to walk us through how these factors are embedded in your analysis by walking through in detail how you got to your damages calculations?
A. I will walk through the damages calculation, and in that will be the assumptions from here, the guidance from here.
Q. Let's start with a high-level overview of the steps that you took in your hypothetical negotiation. What was the -- what's the end result that we're looking for in this hypothetical negotiation?
A. So at the conclusion of this negotiation, the parties -- what I'm trying to estimate is the rate that the parties would have agreed to. So in this case, it's going to be the royalty rate, the amount paid for use of the intellectual property.
Q. And what inputs were there in your analysis for the royalty rate?
A. Well, I start with a view toward looking at how much value is created by the use of the invention. So you go back to the 2018 negotiation and think about what were they expecting the value to be -- to come out of using this, and how much of it would go to Finesse, which would be represented

by their -- the royalty that they would receive.

Q. How did you decide the negotiated share to Finesse?

A. I used an economic bargaining model.

Q. And what about the expected value created by the invention? How did you get to that?

A. Well, here I used -- what I did is I estimated the expected amount of spectrum that was salvaged by the use of this. We had heard that the PIM creates interference and degrades the performance of a network, and by cleaning up that noise, you increase the capacity of the network.

I estimate the amount of spectrum equivalent of that capacity increase and value it to get to the expected value from deploying the invention.

Q. And so how were you able to look at the expected spectrum that would be salvaged by radio that you were just talking about?

A. Going back to the hypothetical negotiation, the question would be at the time that they were negotiating what would they expect the value created when PIM canceling technology was used, so using data that was developed in this matter, I used -- I estimated the relationship between how much noise, how much PIM there is and the decline in the performance of the network, and then I separately looked at tests that were done on what they likely expected was the amount of benefit of noise reduction from using the PIM canceling technology.

Q. So once you've walked through all these steps and you get to the royalty rate, what's the next step in the analysis?
A. Well, we -- the rate is then applied to actual usage. And so then we look at the number of accused radios and the time that they were in use and just simply apply the annual rate to the number of years times the number of radios that were infringing.
Q. Let's start at the bottom and work our way up if you don't mind, sir.
A. Okay.
Q. You told us that the first thing you looked at to get to feed up into your analysis, the performance decline from PIM and the PIM-C benefit to performance. Can you tell us why is it that you were looking at these two components?
A. Well, I like the analogy of PIM as it's if you have a highway and there's some debris on the highway so that you can't use a lane or two, and when that happens and you have traffic that wants to get through but now can't, the performance or the -- of the highway in this case or of the cellular network when it comes to PIM, that the performance in the network would be degraded. And so we want to get a measure of what that a performance degradation is.
Q. Like clearing the debris out of the lanes?
A. Yes. By understanding how much is degraded with the debris, you can estimate how much the benefit or how much

capacity you get back if you take the debris out of the roadway.

Q. We heard a little bit about this earlier today, but how is it that interference, the PIM, this interference, is measured?

A. It's measured as noise, noise in a radio -- radio sense, static as you might hear on a -- on an AM station, and it has the effect of reducing the quality of the signal that you're able to use and it reduces the service. It's like not getting enough bars on your cell phone.

Q. Is there anything that the -- or what -- how does the cellular industry measure performance, whether or not there's good service?

A. So network operators measure many dimensions of the performance the network all the time. This is what they do. They're managing it. The ones I'm going to focus on are the amount of uplink and downlink throughput. This is similar to -- this is a graph from measuring this from a home test for your internet. You might doubt what the -- the internet service is working as it should, and there's tests available that you can test what the download speed and the upload speed is. It's that kind of test that the network operators are doing constantly on their network.

Q. And they use the same kind of measurements for phones as we might use for our internet at home?

A. It's the same -- it's the same idea of the speed, the amount of information that's going up or down the channel at one time.
Q. Why would you use download speed, upload speed, as the measurements, the performance measurements in this case that you were looking at?
A. Well, I want to use them both because we know that PIM -- the way it interferes with the network is it makes it harder for the cell tower to hear the phone. It interferes with the reception. That's the upload speed or the upload part of the network, and so we want to measure how much that's degraded.
But for the performance, the commercial performance of the network, we're ultimately interested in the download speed. So I also -- when you degrade the upload speed, you actually degrade the ability of your phone to download as well. And so I measured that as well.
Q. How was it that you measured what this performance decline would be caused by the interference, caused by the problem, the PIM?
A. So I went to some tests from AT&T that are in Exhibit PX 558, and I separately estimated on the left the relationship -- not yet -- the relationship between the amount of noise, so on the X-axis there, it says PIM noise. This is measured in dB or decibels that we heard about, it's how you

measure the noise, that as the noise increased, the amount of throughput of your uplink channel would go down. And that's the downward sloping curve on the left.

Q. So this is a plot of actual data from AT&T that you used?

A. Correct.

Q. And how did you translate the impact of PIM, of this interference, on upload speeds to how it impacts the download speeds?

A. So using the same data set, I separately estimate the relationship of -- in their tests when the upload speed was degraded, how much was the download speed degraded, and got the relationship on the right. And by combining inputs from both of them, I'll be able to estimate the relationship between the amount of noise and ultimately the degradation in the -- in the downlink throughput.

Q. So once you had looked at all of this data and figured out what the impact on downlink would be of PIM, what was the next step in your analysis?

A. I now needed to put myself in the minds of the negotiators from 2018 and think about how much improvement in noise, how many dB of noise, would they expect that come from using the PIM canceling technology.

And I turned to some tests that Nokia had done where they tested a number of their radios, but included the three models at issue in this matter, and they do a number of tests

with a number of different sort of network settings. And I look at those tests and take the smallest level of improvement from one of those tests.

The assumption is that tests they're doing at that time are in a range that they think are useful to test. And I don't know exactly which range -- where in that range they expect it to be in the future, but I take it to be conservative. I take the smallest of the test results.

Q. And so where would we see a test result in this chart we're looking at here?

A. So for example -- can I draw?

Q. You should be able to draw on it.

A. With my finger?

Q. Uh-huh.

A. Great. So you can see here, for example, there is a test with PIM off so that would be the noise floor or the amount of noise in the background absent PIM -- I'm sorry, with PIM but absent the correction technology. And then right below it is the amount of noise once the feature is turned on.

And so the difference between those two numbers -- I used the mid points of those. The difference between those two numbers would tell you the improvement measured in number of dB that they would get from that particular test.

Q. And is PX 834 the same exhibit we saw the Nokia engineer deposition testimony yesterday about?

A. Yes, that's correct.

Q. Why would you be using Nokia's test data instead of some data that -- of AT&T of actual performance of the radios today?

A. Well, in 2018 -- well, for a couple of reasons. One, in 2018 at the time of the hypothetical negotiation, I want to use what's in the minds of the negotiators at the time. That's -- when that data are available, I want to use them. And so I don't know in 2018 what the AT&T network is going to look like four or five years later.

I do know that when they were testing this technology, that these were the kind of ranges of improvement that they thought would be useful when the technology is deployed.

Q. And so how did you put these two sets of test data together, the impact of PIM on downlink that you calculated and then the improvement that's created by the radios from Nokia's own tests?

A. Sure. So the blue block on the left side is the output of the three different radios models that are at issue here. And of the set of tests on each of them, I'm reporting the one that I use which is giving me the smallest difference, the smallest improvement. So, for example, for the AHFIB radio, there's a 5.4 dB improvement in performance.

I then take that dB improvement that was expected for that radio and feed it into those first two equations we

looked at that tells me first what's the effect on the uplink and it tells me for this example that the uplink would be about 30 percent of what it would be with no interference.

And then I take that 30 percent uplink retention and feed it into the second equation to get the downlink retention, and that tells me that the downlink would work at about 83 percent of what it would do absent the 5.4 decibels of noise.

And recognizing that the PIM correction would take out those 5.4 decibels, I am able to calculate that that -- in that example that would be about a 20.4 percent increase in the performance of that radio.

Q. Why is it 20.4 percent instead of 17 percent to get from 83 percent to a hundred?

A. Right. It's the -- if you start at 83 percent and go up to a hundred, that's a 20.4 percent improvement in how your network is working or how your radio is working.

Q. How is it 20.4 percent and not 17?

A. Well, it's 17 divided by 83. So 17 percent is starting at a hundred percent. The 20.4 is what you get if you start at the 83 percent.

Q. So what was the end result of the spectrum -- percent of spectrum salvaged by radio based on AT&T's and Nokia's test data?

A. So when I put that all together, what I come up with is that for the AHLBA model there was an expected 23.8 percent

improvement in the performance from using the PIM-C technology; that for the AHFIB radio, it was a 20.4 percent improvement; and for the AHLBBA radio, it was a 14.5 percent improvement.

Q. So once you determine what the performance decline from PIM would be and the PIM-C benefit to performance of the cancellation itself, what was the next thing that you looked at?

A. So this is a measure of the performance benefit, and I now want to measure how much spectrum does that represent, how much spectrum is -- how many lanes of the highway are being cleaned up by this, and to do that I need to know a few other things, including how much of the radio spectrum that's being improved is actually deployed on a given radio in the AT&T markets.

Q. So how did you do the analysis of calculating the expected spectrum salvaged per radio?

A. In several steps.

Q. What was the first step?

A. So I looked at a document that -- an Exhibit 580 from AT&T that shows the -- I think it was from AT&T, that shows the models at issue by market. So because AT&T is likely to own different amounts of spectrum in different geographic markets, to measure this as best as I can, I want to take account of where a radio is so I can match it up with how much

of the relevant spectrum that the radio uses that AT&T owns. So the first thing was to figure out where the models of Nokia radios were.

MS. FAIR: Mr. Boles, can you pull up PX 580, please?

Q. (BY MS. FAIR) And is this PX 580 that was the data set you used to determine the total models of radio at issue by market?

A. Yes. This was a data set -- this is a summary page from a much larger part of this spreadsheet that has the underlying data that by radio could tell me what market each radio was in.

Q. So, for example, if we want to know how many of the AHFIB radios are in the Arizona/New Mexico market, where would we look?

A. That would be the number represented under C5, the 3,230 radios would be the count that came out of the database of the number of that model of radio in that market.

Q. And where is the data being fed into this table from?

A. It comes from the next tab over, so detail. And that's a very long list of radios in the AT&T network, and it tells me where they are in the first two columns, and in column H, it tells me the radio name.

So we can search through -- we do it through programming, but we can pull out all of the counts of specific models of

radios in specific markets.

MS. FAIR: Mr. Boles, can we go back to the presentation? Thank you.

Q. (BY MS. FAIR) Once you had pulled together how many radios of each model were in each market, what did you do next?

A. Well, I am using -- because I'm trying to think about the expectations of where they would be using these radios, I want to now look at -- narrow this down to the radios of these model types that actually have the PIM-C technology turned on.

AT&T doesn't have them turned on in all of the radios. They have them turned on in average about 78 percent. So I look at PX 954 to estimate that 78 percent, the share of the radios that are turned on.

Q. Why would you be looking at just the ones that are turned on?

A. Well, because I'm trying to use this in the 2018 hypothetical negotiation about an expectation of where the -- they would expect it to be useful and that would -- I assume that they only turn it on in areas where it's useful or, to put it the other way, where they don't turn on the radio, they assume they're not going to get any benefit from PIM-C.

Q. And where did you get the information about the nationwide activation rate of how many radios are turned on?

A. That was in PX 954.

MS. FAIR: Mr. Boles, can you pull up PX 954, please?

Q. (BY MS. FAIR) And this is another very large spreadsheet, Doctor Bazelon?

A. Yes, listing all the radios. I think we saw this yesterday as well. And it's if column C and D are listed as true, then you know that that specific radio has the feature turned on. And because we have the radio head type, I could count the number by model where the switch was turned on.

What I couldn't do is map this directly to markets. So that's why I apply this percentage to the market mapping from the first step.

MS. FAIR: And, Mr. Boles, can we scroll down some so we can see kind of what this data is looking like all the way through.

Q. (BY MS. FAIR) And so to get the percentage, did you take all of the total number of each of the types of radio at issue and then how many of those it was set true in column C and true in column D?

A. That's correct. And by radio type.

MS. FAIR: Mr. Boles, can we go back to the presentation?

Q. (BY MS. FAIR) So once you had -- by the way, I think you may have said this, but why are we looking at a nationwide

rate of what's turned on instead of on a radio-by-radio basis within each market which ones have PIM-C turned on?

A. Because I wasn't given the location data for the radios that were turned on. So I'm making the assumption that the rate of usage of the technology is the same across their network because I have to make that assumption.

Q. So once you had pulled and looked at the models at issue by market, the activation rate nationwide, what was the next step in figuring out the spectrum salvaged on a radio-by-radio basis?

A. The next step was to look at how much radio spectrum AT&T was licensed in each of these different markets so that I could do a market-specific analysis of the radios.

Q. What do you mean by looking at the specific spectrum holdings within each market? Do they not own all of band 12 or band 14, these bands we've been hearing about, all over the country?

A. Yeah. The bands are what the FCC allocates as a big swath of spectrum for a certain, you know, technical specification and use. The actual licensing of it is what happens at the auctions. It is unusual that a single carrier will own all of an entire band of spectrum. Usually, you know, for one band AT&T will own a certain amount and T-Mobile will own a certain amount and so forth.

Here we can see that for specific bands in specific

markets like in Idaho on band 12, that they own different amounts, 20, 20, and 17. Sorry, let me resay that. For the band 12 spectrum, they own 20 megahertz in Idaho, they own 20 megahertz in Arizona, but only 17 megahertz in Wisconsin.

So it's that market-by-market variation in what they own or have license that I'm capturing through this part of the analysis.

Q. And your analysis took that into account for each radio based on where they were deployed, what band -- what portion of the band AT&T owns?

A. That's correct.

Q. So once you looked at that, what was the next step in your spectrum salvage per radio analysis?

A. So each radio is designed to use specific bands of spectrum, and the specifications are here on the right. So the AHLBA uses bands 12 and 14, the AHFIB uses bands 25 and 66, and the AHLBBA uses bands 12, 14, and band 29.

So I now want to know by market for the bands for the radios in that market, what are AT&T's specific spectrum holdings.

Q. And so what was the next step, once you correlated the radio model, what bands it operates on, their holdings in the specific markets in which they're deployed radio-by-radio, what did you do next?

A. So I then had to decide which of the band on the radio is

being improved by their -- the PIM-C technology. It might be both bands, but I don't know that, so I have to pick one. And when there is a choice to be made, I pick the smallest band that they own in that market.

Q. And that's representative of the smallest range of frequencies that could be interfered with is this assumption there?

A. Yes. I realize it's a little confusing that I used the word band for a range of frequencies when it's also what called for the band numbers. But, yes, to be more specific for the range of frequencies licensed to AT&T in a market, I use -- when there's a choice, I use the smallest range of frequencies or amount of spectrum.

Q. Now, when we were looking at the testing data and how you calculated the percentage of performance benefit from PIM-C, we looked at tests, not actual deployment information because we were in the hypothetical you told us.

Why here in this process are we looking at actual deployments of the radios?

A. So if I had had information about where they expected to deploy these radios, the sort of geographic distribution of the use of these radios, if I had that information from 2018, I would have used it, but I didn't. So, instead, I substituted as good a guess as any as to what was in their mind what they actually ended up using it as the set of radios

to look at.
Q. So you did this analysis by model, by market, by activation rate, by the specific holdings that AT&T has within that market. Was this a quick and easy process to do?
A. It was not. It took a lot of effort last summer.
Q. How much time did it take to consolidate and correlate all of this data, radio by radio, market by market, holding by holding?
A. It took my team a lot of time over the summer.
Q. How much did that cost?
A. I think our total billings, not just for the summer but up until just before trial, were about a million dollars, and that represented over 2,000 hours' worth of work by myself and my team.
Q. So once you had gone through this detailed analysis radio by radio, what was the next step to get to the expected spectrum salvaged per radio?
A. So in the first step -- the first part of the analysis where I'm looking at the performance improvements to estimate the spectrum that's salvaged from using the PIM-C technology, it was in a percentage improvement. I now apply those percentages to the spectrum I have just identified by radio by market that AT&T actually owns to get an estimate of what the salvage spectrum frequencies were, how many megahertz were salvaged of which band of spectrum in each market by each

radio.
Q. So on your big analysis spreadsheet that you had, it's row by row, there's a megahertz answer for each radio?
A. Yes. It's in program -- it's all programmed. But, yes, conceptually that's quite right.
Q. So once you had the megahertz -- the range of megahertz of spectrum salvaged per radio that they would have expected, how did you look at the value of that spectrum?
A. So those megahertz expected to be created were the expected benefit of this invention, and I now need to put a dollar value on what that expected benefit was. So I look at the value of those frequencies that were salvaged and -- and put a dollar value on them.
Q. Where did you start that analysis?
A. Well, I looked at a recent FCC auction--recent, it was 2015, but it was recent before the negotiations--that sold some comparable frequencies to the ones that AT&T uses in its network, and that auction raised over $41 billion in bids for the federal government.
Q. Now, why would you be starting with an auction that happened a few years before, shortly before the hypothetical negotiation, instead of the actual cost of what AT&T spent on this spectrum that it holds?
A. So the -- AT&T's portfolio of spectrum, it is acquired over the last probably 40 years in different transactions and

auctions over time. They -- the value of that spectrum, just like the value of your house over 40 years, keeps appreciating. So I want to value it as of the time of the negotiation. So I'm looking for a market price of spectrum to use that's near the time of that hypothetical negotiation to value the spectrum in their portfolio that's saved.

Q. And we talked about spectrum auctions so there's more than just this one auction that's happened. Yes?

A. That's right.

Q. Why did you choose this specific auction to look at?

A. So it was a big one that was considered a successful auction in that the price that came out of it was considered a market benchmark, and it was --

Q. What do you mean by that?

A. Oh, that the auction didn't have problems so that the amount paid represent -- everybody's expectation is that the amount paid in this auction represents the underlying value of the frequencies and that no bidders got particularly good deals on it or anything like that that would undervalue it.

Q. So once you had this $41 billion for this auction that took place a few years before -- by the way, where does this information come from?

A. It comes from Exhibit PX 518. This is public information from the Federal Communications Commission that I -- I use constantly in all of my work but could access for this.

Q. So once you had the $41 billion in the -- in that auction, how did you get to the price of spectrum on a unit price level?
A. So I'm trying to put the -- yeah, a unit price on spectrum to apply it to the salvaged megahertz. So the first thing to notice is that the -- I'll go straight to the answer which was $2.53 per megahertz pop. I have to explain that in spectrum valuation, to create a unit price we use this measure called megahertz POPS, and it's the amount paid in an auction or transaction for spectrum expressed as a dollar amount per megahertz in the transaction that covers just one person covered by the geographic license. So it's sort of like a unit price of spectrum.
Q. You said one person. Is that what the POP is?
A. Yes.
Q. So one megahertz, one person, what's the unit price there?
A. Yes.
Q. So how did you get to $2.53 per megahertz POP from the $41 billion we saw on the previous slide?
A. So that big auction that raised $41 billion had some frequencies that were sold that really weren't comparable at all to what's in AT&T's network. So I first removed those -- the bids for those frequencies.
Q. Why weren't they comparable?

A. They were restricted for uplink only. And as I mentioned earlier, the downlink is where the networks are constrained. Carriers such as AT&T want more downlink spectrum than they do uplink. So if you have frequencies that are only useful for uplink, they're really not worth -- not worth much but they don't add much capacity. They don't add any capacity to your system. So they're just not comparable to the type of spectrum that was salvaged.

Q. So how much was the comparable spectrum that was licensed?

A. So after removing those frequencies, the total bids were $39 and a half billion for the comparable spectrum.

Q. So how did you get from 39 and a half billion to $2.53 megahertz POPS?

A. Cents per megahertz POP. I -- so I need to estimate the number of megahertz POPS in the spectrum auction that are represented by that 39 and a half billion dollars. So these -- this auction sold licenses that covered the entire U.S., and in total it was 50 megahertz of spectrum that covered the entire U.S. So 50 megahertz of spectrum times the population of the U.S. comes out to 15.6 billion megahertz POPS. So dividing 15.6 into 39.5 is where the $2.53 of megahertz POP comes from.

Q. Excuse me. I'm sorry.

Once you have the national average unit price of

spectrum, were you done? You just applied that to the megahertz that were salvaged by radio?
A. Not quite. There was one more step in there.
Q. And what is that?
A. That even once you create the unit price of dollar per megahertz POP for spectrum, there were still known, well-recognized variations in value of spectrum, depending on the geography that it's in. Kind of typically a rural area, the spectrum value is going to be less than in a dense urban area.
And so recognizing that, depending on the band of spectrum and where it was, its price relative to the national average price might vary, for example, 36 percent for the AWS1 spectrum in Idaho, but in Arizona the 700 megahertz spectrum is worth almost or a little bit more than twice the national average for 700 megahertz spectrum.
So recognizing those regional pricing variations, I could then take the $2.53 per megahertz POP price and calculate the market-specific price for each of the markets where AT&T was deploying the technology.
Q. You said AWS1, and I see that here in 700 megahertz, what does that mean? What are those?
A. Those are -- when we say band -- well, for example, band 66, which is used on one of the infringing radios, band 66 refers to AWS spectrum. I am -- I typically refer to it by

its more common name like AWS1, but it's a mapping from those names to the band numbers that are used in the radios.
Q. And so you weighted the spectrum by market and by which frequency band it was in, you applied that ratio of what it would be to the national average for each market for each frequency range?
A. Yes. So, for example, in Arizona for the 700 megahertz, the dollar-per-megahertz POP price would be a bit over $5, a little bit more than twice the $2.53.
Q. So once you had the megahertz of spectrum salvaged per radio and that unit price of spectrum by market by frequency range, how did you get to the expected value, the total expected value created by the invention?
A. Well, I valued the individual spectrum, multiplied it out, and then summed it up across all the radios.
Q. So we see this equation here. What is the ultimate unit, what's the ultimate measurement we're trying to get to with value?
A. A dollar figure. What's the value of the salvaged spectrum. And I start at the radio level.
Q. And so how do you get from the dollar-per-megahertz POP unit for the unit price of spectrum to just dollars?
A. So you'll forgive the math class, but you might recall that when you multiply things out like this, they cancel out. So megahertz would cancel megahertz, POPS would cancel POPS,

and then you're left with dollars. So get to a dollar number, I need to know the dollar-per-megahertz POP price, the number of megahertz, and the number of POPS covered by an individual radio.

Q. And so at the beginning in the first analysis we did, did we figure out what the megahertz expected saved by radio would be?

A. That's -- yes, the effort there was to figure out the amount of salvaged spectrum in megahertz.

Q. And then we looked at the unit price of spectrum by market by band that we just did?

A. From the auction with the regional variations layered onto it.

Q. And so what's the last piece of puzzle to get to the dollar sign?

A. Just how many people on average a radio would cover.

Q. How did you do that analysis?

A. So I looked at AT&T's network from just before the hypothetical negotiation and rough -- using rough -- very roughly, their network didn't cover quite the entire U.S., but around 306-and-a-half million people. They had about 67,000 towers in their network.

So from that, I could calculate that there was about 4,500 people covered by each cell tower, given -- given all the frequencies and stuff, big towers, small towers, they all

on average covered about 4,500 people.
Q. How do you get from a number of people that each tower covers to the number of people that each radio covers?
A. Well, towers divide themselves -- and you can see from this picture that there are sets of radios pointing in three different directions. And you'll see this if you -- around town. If you look at a cell tower it tends to be three sets of radios. So each radio covers about a third of the territory, the geography of -- of a tower.
Q. What if there's more than one radio in a sector?
A. They still cover the same people. So there might be on a given tower multiple radios covering the same set of people with different frequencies. And on many towers, you know, provided by different cell phone companies that are sharing towers, there can be lots of radios covering the same individuals.
Q. So once you tabbed up all of the radios by market, by spectrum, where they operated, activation rates, how did you get to the total expected value that the parties would have expected the use of the invention to create in 2018 when they sat down at the hypothetical negotiation?
A. So I just summed up this expected value per radio times the number of radios that were deployed using the technology to get about a billion 50 million dollars as the value of the spectrum that would be salvaged by -- the expected value of

the spectrum that would be salvaged by the PIM-C technology.
Q. So once you had the $1.05 billion of expected value created by the invention, what was the next step to get to the royalty rate?
A. We're almost at the royalty rate. So the next step is to figure out of the value created from using the invention, what share of that value would go to Finesse. So the royalty rate is their payment for the use of it. So out of the total value created, I want to estimate how much of that value would go to Finesse.
Q. Why wouldn't all of it go to Finesse if they're using Finesse's invention in this hypothetical? We've assumed infringement. Why doesn't it all go to Finesse?
A. Well, for two reasons. One, AT&T's a better negotiator than that and are unlikely to give away all the value in a negotiation. The other is that this is the value of spectrum, which is an asset. Once AT&T has it, they have it -- it's licensed, but they expect to have it forever. But the patents will expire. So there is some time in the future where, after the patents have expired where AT&T would just be able to create this value without having to pay Finesse.
So we had to take into account the time frame of the coverage of the intellectual property as well.
Q. You told us at the very beginning when you were outlining your analysis, you used a bargaining model to figure out what

the share would be that Finesse would get. Tell us a little bit about that bargaining model.
A. It was a model that I drew from the economics literature, alternating offer bargaining model. It models a process where each side -- you imagine each side making an offer and a counteroffer, and you work your way back to where they would -- where they would agree at the beginning of the process.
Q. So how do you go about doing that? I mean, how do you put a quantitative value on this hypothetical bargaining that's going to take place?
A. Well, using this -- specifying this model from the literature, there's a few inputs you need to know about how to characterize the bargaining. It has to do with each party's impatience. So recognizing, as I said, AT&T could wait until the end of 2029 when the '175 [sic] Patent expires and implement this technology. So what they're really bargaining over is how much sooner they can get access to it.
So the first thing you need to know is how long a period are they bargaining over? And depending on which patent, the number of months varies. It's much longer for the '775 Patent, and I think the 79 might need to be corrected.
Q. Yeah. So the Defendants, as you know, has an expert who criticizes your analysis, Doctor Becker?
A. Yes.

Q. And you've read his criticisms?
A. Yes.
Q. Were there any that you determined warranted revisions to your analysis?
A. In general, no. But in a -- in a criticism I received last week from him, he pointed out a rather small programming error in one of my spreadsheets that had to do with how we were calculating the number of months. It had to do with a rounding function. And I believe the 79 really should be 81 months instead of 79 months.
Q. You mentioned a little bit ago that this model looks at the impatience of the parties. How do you measure patience?
A. Well, I'm an economist so I measure through discount rates or interest rates. So, in essence, it's the question of, if you could have a dollar in a year from now, how much would you accept today instead of waiting a year. And so -- and that's a rate of interest and that's how we measure the impatience.
Q. What numbers did you use to measure that impatience here that we're seeing on the screen?
A. So I use a term, a measure from the financial industry called the weighted average cost to capital, the WACC. It's kind of a funny name for it. It is the general -- what's viewed as the borrowing or the costs of money to a company, and this is a WACC from the spectrum industry.

I take out inflation from it so that I can do my analysis in real dollars to make it just much simpler to implement, and then calculate or translate that real WACC to a monthly discount factor.

Q. So how do you, after all these inputs, get to the Finesse share of the spectrum?

A. So you run this through these inputs, through this bargaining back and forth alternating offer bargaining model, and what comes out is, in the case of the 79-month horizon, Finesse's share of the value created, total value created would be about 11 percent.

And in the example that goes -- or the case where the '775 Patent is valid and infringed and therefore the intellectual property rights go through until 2029, that Finesse would get about 17.6 percent of the share of the total value created.

Q. So now do we just take the 11 percent in the case of the '134 only or the 17.6 percent and apply it to the $1.05 billion?

A. Sorry, no. There's one more step we have to do because we want to recognize the royalty is only going to be applied when AT&T is actually using a radio. So we take this analysis about this entire time period in the value that they expect to be able to create and turn it into an annual percentage rate or an annual royalty rate.

So for these numbers, we divide the total share over the time period by the number of years in the time period to get sort of how much would be credited to Finesse in each year.
Q. And so what's the annual royalty percentage if we're looking at a situation where only the '134 is infringed?
A. 1.68 percent.
Q. And what about if the '775 is infringed either with or without the '134?
A. Then it would be 1.54 percent of the total value created.
Q. So it's less per year that AT&T would be paying per radio if the time period is longer?
A. It is. It's a result of the math. It has to do with as you add more value of spectrum from later periods, it adds a little bit less than the average amount of value to the total, so that the average goes down.
Q. What do we see here? Is this a table that you created?
A. It is.
Q. Is the jury going to have this on a document that's been produced in this case?
A. My understanding is no, that it's not in any of the exhibits you have, so this is the opportunity to see these numbers.
Q. How did you get from the annualized rates to the dollar amount per radio per year that we saw at the beginning of your presentation?

A. So I do this by radio, but you can see, you know, the total is the 1,050 million. I can see how many units there are and for -- so by dividing those, I will get the average spectrum salvage. And then of that, at the radio level I can apply the 1.68 percent. And for the example of only the shorter time period through 2024, the royalty rate ends up being $272.
Q. And what is the royalty rate if we're looking at the time period through 2029?
A. So there it's the same dollars per radio as in the first calculation, but now the share of that value per year that Finesse is going to capture is just a little bit lower, so it turns out to be $251.
Q. So where are we now in this analysis process to get to damages?
A. So all of that was this hypothetical negotiation to figure out that back before the first infringement, had AT&T and Finesse sat down with knowledge of the patents being valid and infringed and with the intent of coming to an agreement as the law directs us, what rate would they have negotiated. And the rates are here. It's this per radio per year royalty rate for using the PIM-C technology.
Q. What do we apply that to?
A. So then that rate that they negotiate would then be applied to actual usage of the radios by AT&T.

Q. How do we know what that use is?
A. Well, we have data from PX 951, which I think we referred to earlier. So this is the sales data for the models at issue here. And what's important here is I know how many of the radios came on, but I also know when they came on so that I can only ultimately only start charging as the radios are -- are bought and put into use.
Q. So where do we see here, for example, the first grouping when -- how do we know from this when the radios would be in use?
A. So in this example, it would be from the columns -- it's going to be C and D that give you the year and the month.
Q. The fiscal year and then the one just to the right of it, posting --
A. -- period, which I believe is the month within the year.
Q. So, on average, how many unit years would there be through trial for the three model radios at issue?
A. So using those -- the data about when it came on -- I'm just going to take the average starting date across them because it will make the math so much easier as we go forward. So from the average starting date of the AHLBA radios, the 31,901 of those units, they on average through today have been active 3.4 years.
Q. And what about AHFIB and AHLBBA?
A. The AHFIB have been active for just over four years, 4.1

years, and the AHLBBA has been active on average 1.7 years as of the end of 2022.

Q. And what about for the average unit years to expiration in the 2024 time scenario?

A. We are just adding the additional time to the expiration of the first patent. So for the AHLBA, it's 5.4 years on average; for the AHFIB, it's 6 years on average; and for the AHLBBA, it's 3.7 years on average.

Q. And what about for the 2029 time scenario?

A. For the same three radios, it would be 10.1 years, 10.7 years, and 8.4 years.

Q. And, again, is this something that is in a document that the jury's going to have, or is this the result of your team's detailed analysis in this case?

A. This is -- this is what we spent our summer doing.

Q. So once we have the rates from the hypothetical negotiation to then be applied to actual use, what can we do now?

A. Actual use and the number of years that they've -- the radio is used and the years they've been used, you then multiply it out to get the damages number.

Q. So what do we see here? What is this table calculating for us?

A. So to take the first example of the royalties through 2022 when the patent expires in 2024, that's the 62, almost 63

million dollar number we saw at the beginning. That's calculated by radio.

You take the number of active units of the radio, times the number of years that it's been in use for that scenario, times the per radio royalty rate, and multiply it out to get in that case a little over $38 million.

Repeat that for each of the radios and each of the scenarios and sum them up.

Q. So what are the royalties through 2022 for the AHLBA radio?

A. It would be $38,384,031 if the negotiations end in 2024. If the '775 Patent was found valid and infringed, then the royalties through the end of 2022 for that radio would be $35,355,580.

Q. And what about for that radio to expiration of the 2024 where just the '134 is infringed, what would it be?

A. For the AHLBA -- oh, to the end of the patent expiration, that would be $59,860,440.

Q. And what about through expiration of the '775 Patent, what would the royalties be for the AHLBA radio?

A. For that radio, it would be $104,177,293.

Q. And what about for the AH -- again, the jury's not going to have these numbers on a document. Right?

A. That's my understanding, yes.

Q. So what about for the AHFIB radio? What are the four

damages calculations for that radio in the four use scenarios that you did?

A. So for the same set of use scenarios, it's $23,526,082; $34,660,687; $21,669,905; and $57,351,036.

Q. And then what about the AHLBBA radio?

A. And for that radio for the same four use cases, it would be $1,069,676; $2,252,310; $985,280; and $4,775,062.

Q. So, in total, if we're in a situation where just the '134 is infringed, what would the damages be through trial and what would the damages be if AT&T were to pay fully paid up all the way through the end of expiration?

A. So if it was just for the usage up to today or last week, it would total $62,979,790. If AT&T continued to infringe the same radios through the second of December of 2024, it would be $96,773,438.

Q. And what about for AT&T's infringement where the '775 is infringed? What would the damages be if you calculated it through trial and what would it be if it were paid up all the way through expiration of the '775 Patent?

A. So in this case we're going to be applying the $251 per radio per year royalty rate. And what we'll get is $58,010,765 through trial, or if the level of infringement continued through the expiration of the patent, the total damages would be $166,303,391.

MS. FAIR: I pass the witness.

THE COURT: All right. Before we proceed with cross examination of this witness, ladies and gentlemen, we're going to take a short recess.

If you will, simply close and leave your juror notebooks in your chairs. Use this opportunity to stretch your legs and get a drink of water, and we'll be back in just a few minutes to continue with this particular witness who will be cross-examined by the Defendant and Intervenor.

Follow all my instructions, including not to discuss the case with each other, and we'll see you shortly.

The jury's excused for recess.

(Whereupon, the jury left the courtroom.)

THE COURT: Be seated, please.

Two things before we recess. Number one, since we were back in session after lunch, there was a moment when somebody's cell phone rang. It was very quick and it was very is faint and I didn't make an issue of it at the time, but I heard it.

Your electronic devices are to be on silent at all times or turned off. If I hear another disruptive noise of that type, I'll stop the proceedings and have the Court Security Officer confiscate the offending device. So just make sure that if you have a cell phone, you're a guest in the gallery or here at counsel table, that it is on silent.

Secondly, I've reviewed the latest iteration submitted by

the parties of a proposed final jury instruction and verdict form. I'm persuaded the Court would benefit by an updated submission in that regard. So I'm directing the parties to jointly prepare and to submit an updated proposed final jury instruction and verdict form by 3:00 tomorrow afternoon.

It needs to be in Word format transmitted to my staff by email. It needs to be a single submission, not two competing submissions. You can certainly highlight your differing submissions at any portion in the documents where you're not in agreement, but submit it as a single submission, both as to the final jury instruction and as to the verdict. And I'll look for that transmitted to us not later than 3:00 tomorrow.

I'd like to keep this recess relatively short, not more than 12 or 15 minutes.

And with that, we stand in recess.

(Brief recess.)

THE COURT: Be seated, please.

Mr. Dacus, are you prepared to proceed with cross-examination?

MR. DACUS: I am, Your Honor. Thank you.

THE COURT: All right. Let's bring in the jury, please.

(Whereupon, the jury entered the courtroom.)

THE COURT: Please be seated, ladies and gentlemen. Welcome back.

We'll proceed with cross-examination of Doctor Bazelon by counsel for Defendant and Intervenor.

You may proceed, Mr. Dacus.

MR. DACUS: Thank you, Your Honor.

CROSS EXAMINATION

BY MR. DACUS:

Q. Good afternoon, Doctor Bazelon.

A. Good afternoon.

Q. I'm Deron Dacus. I represent AT&T and Nokia. I don't think you and I've ever met before, sir?

A. I don't recall meeting you.

Q. It's good to meet you. I'm sorry it's under these circumstances.

A. Next time will be better.

Q. I'd like to ask you a few questions if that's okay?

A. Yes.

Q. First thing I want to do is make sure we all understand your role in this case. Is that fair?

A. Okay.

Q. You have no opinion and you're not here to give any opinion on whether or not AT&T infringes these patents. Correct?

A. That's correct.

Q. You're not here to give any opinion on whether or not these patents are valid or invalid. Correct?

A. That's correct.
Q. And you would agree with me that in what I heard you say in your calculation of damages, you just assumed that there was infringement and that the patents were valid. Correct?
A. Correct.
Q. You understand that AT&T and Nokia say that's not correct, there's no infringement, and the patents are invalid. You understand that?
A. I do.
Q. And if the jury finds that there is no infringement, then you agree the damages are zero.
A. It doesn't come to damages if there's no infringement.
Q. So no damages if no infringement. Correct?
A. That's my understanding of the law.
Q. By the same token, if the patent is invalid, then there are no damages. Correct?
A. That would be my understanding of the law.
Q. Okay. So if the jury finds either one, either the patents not infringed or the patents invalid, then there are no damages, and with all due respect to you, they can basically ignore what you've said. Correct?
A. I think that's correct.
Q. Okay. You were here when the Judge read his preliminary instructions, were you?
A. Yes.

Q. You've been here for the entire trial?
A. Yes. I came mid morning on Monday.
Q. Okay. You heard the Judge tell the jury that for each witness, they need to assess credibility and reliability of the witness. Correct?
A. Yes.
Q. And in particular for experts, he said they need to look at the expert's particular experience in the subject matter that they're testifying on. Correct?
A. I believe that sounds correct.
Q. Okay. So it sounds like -- well, that sounds correct. That makes common sense, doesn't it?
A. Sure.
Q. I mean, if you were going to go have someone appraise your house, you would not go hire someone who had only done appraisals for cars, would you?
A. Probably not.
Q. You'd hire a house appraiser. Correct?
A. Correct.
Q. Okay. So it sounds to me what you told the jury is you have lots of experience with spectrum. Is that a fair statement?
A. I do have a lot of experience with spectrum.
Q. But you're here telling this jury and asking them to rely on you with respect to what these two parties would have

negotiated for a patent license. Correct?
A. Correct.
Q. That's the subject of your testimony. Correct?
A. Yes.
Q. But the truth is, sir, you personally have never negotiated a telecommunications patent license in your life. Correct?
A. I am not a patent negotiator, that is correct. I'm not a practices person.
Q. Not only are you not one, you've never done it. Correct?
A. That's right. I've never negotiated a license for a patent.
Q. Any type of patent. Correct?
A. Correct.
Q. So you're here asking these folks to rely on your testimony as to what two parties would have negotiated for the patent license, but in truth and fact that's something you've never done. Fair characterization. Correct?
A. Yes, that's -- that's correct.
Q. Okay. You're also here talking about in this negotiation the value of this feature called PIM cancellation or PIM-C. Correct?
A. Correct.
Q. Again, you want the jury to rely on your experience in that regard. Correct?

A. They should rely on my experience for sure.
Q. Okay. But it's true, sir, that before this lawsuit was filed, you were not familiar with PIM cancellation technology, were you?
A. I knew of PIM as an issue, but I was not particularly familiar with how it worked or anything, no.
Q. So let me be clear. You said you were familiar with PIM. You're telling them the value of PIM cancellation, and I want to be clear on my question. Before this lawsuit, you had no experience and no familiarity with PIM cancellation. That is a true statement. Correct?
A. I think that's correct.
Q. Even with all this work in the industry that you've described to the jury about spectrum and valuing it, you were not familiar with PIM cancellation, the feature that you're here to value. True statement.
A. I am aware of issues in the industry. And as I think I said, I was aware of PIM and that it is an issue and I understand what cancellation is. I had -- was not -- did not know anything specific about this technology before this -- this matter.
Q. You've never worked as an employee of a telecom provider like AT&T or Verizon or T-Mobile. Correct?
A. Not as an employee. They've been my clients.
Q. You've never been employed by a telecom provider to

assess and determine how to remedy or cure PIM. Correct?
A. That's not my expertise. That's correct.
Q. You agree that this PIM problem and PIM cancellation is an engineering issue. Correct?
A. It's a technical issue in the telecommunications network, and engineers address it.
Q. You're not an engineer.
A. That's correct.
Q. You've told us you have your Ph.D. in economics from I think University of California-Berkeley. Correct?
A. Yes.
Q. As between you and an AT&T engineer whose job it is to assess and remedy PIM, who would you think has more knowledge on that issue?
A. Of actually going out into the network and remedying it? It would be the engineer for sure.
Q. Okay. I want to ask you some questions about the methodology that you used in calculating the damages. Does that sound fair?
A. Okay.
Q. But before I do that, did I hear you earlier that, despite the experience that you and I just went through, your rate or the rate that your firm is charging is $775 an hour?
A. It's -- yes, it's the rate they charge for my services to commercial clients.

Q. Okay. Now, with respect to the methodology that you used, you agree in determining a royalty that you need to assess the dollar benefit to AT&T of using PIM cancellation. You agree with that?

A. The -- in the hypothetical negotiation, the expected value at the time of the negotiation, yes.

Q. I wrote down on your direct you said, AT&T should only have to pay for, quote, the actual use of PIM cancellation. Did I write that down correctly?

A. Yes. In the second step of applying the royalty to damages, they should only pay the royalty on the units that are infringing.

Q. And you went about, as you just explained us, you went about calculating that alleged benefit to AT&T by estimating the value of the spectrum that was salvaged or saved. True?

A. That was an important input into my analysis of coming up with the per radio royalty rate, yes.

Q. You understand that AT&T says that's the wrong measure for measuring the benefit to AT&T of PIM cancellation. You understand that's our position.

A. I suspect it is.

Q. Okay. Well, you know it. You've read our expert's report. Correct?

A. It's Doctor Becker's position, yes.

Q. And you know we say, and we'll have witnesses to say,

that we do not go buy spectrum in order to remedy any PIM problem that we might have. Correct?
A. Correct.
Q. And, specifically, we don't go buy any spectrum to remedy an internal PIM problem. You understand that?
A. That, too, yes.
Q. In fact, the evidence you've seen in this case, you're not aware of AT&T ever saying that PIM concerns would lead them to buy or purchase spectrum. That's a true statement?
A. I have no evidence that you've gone out and purchased spectrum in response to PIMs. That's correct.
Q. So to be precise here, the issue that we need to look at in this case is what benefit AT&T gets from PIM cancellation specific to internal PIM. Correct?
A. My understanding is that the models of radios are designed to address internal PIM, yes.
Q. Okay. The radios that are accused of infringement address internal PIM. Correct?
A. That was my -- that's my understanding that that's what they're designed for, yes.
Q. They do not target or solve external PIM problems. Correct?
A. That would be a question for an engineer.
Q. You have in front of you, sir, your report that you wrote in this case. All right?

A. Yes.
Q. So that it's clear and the jury understands, the way the rules work in this court is you have to write down in a report what your opinions and conclusions are in this case. Correct?
A. Correct.
Q. And then you have an opportunity -- you wrote it, you read it, and you sign it. Fair?
A. Yep.
Q. Okay. So if you turn to page 24 of your report, let me know when you're there?
A. I'm there.
Q. If you go to paragraph 45.
A. I'm there.
Q. And if you go down to the third sentence in your report, let me know when you're there.
A. The one that starts, the Nokia remote radio heads target internal PIM?
Q. Yes, sir.
A. Yes. As I said, my understanding is that's what they're designed for.
Q. Okay. So what we should be looking at here is the value to AT&T, if any, of canceling internal PIM. Fair?
A. Yes. As I say, my understanding is that's what those radios are there to use.
Q. And you agree for the purpose of measuring the benefit of

this PIM cancellation, we should only be looking to internal PIM.

A. To the extent that's all they're canceling, that's fair, yes.

Q. Well, that's what you did in this case is measure the benefit of canceling internal PIM. Correct?

A. That was what I -- canceling internal PIM is what I understood the radios to be doing. The benefit is actually -- the measure is just of canceling PIM. So my analysis is not tied to internal versus external. But my belief going in, my mindset, was that it was focused on internal.

Q. So let's be clear here. Are you saying that for a product that only cancels internal PIM, you measured the value of canceling both internal and external?

A. No.

Q. Let's be really clear. Did you only value the benefit of canceling internal?

A. I valued the benefit of canceling PIM, and I understood it to be internal PIM.

Q. Okay. You agree there's a difference and a distinction between internal and external PIM. Correct?

A. I understand the one that's -- I understand there's a distinction between them. I'm not sure there is a distinction between the value of canceling it in the sense that it's noise in the radio, and if you get rid of the noise in the radio,

you improve performance, and that has value.

Q. You understand there's a difference in how you go about preventing, mitigating, or curing internal PIM versus external PIM. Correct?

A. I understand there's different approaches that we've heard about. Some are focused more on internal, some are focused more on external.

Q. You understand that AT&T's position is and the evidence will be that, for internal PIM, they use site hygiene or maintenance to cure that issue. You understand that's AT&T's position?

A. I've seen that testimony.

Q. In your damages calculation, you did not do a calculation of how much maintenance or hygiene costs were saved by using this PIM cancellation feature, did you?

A. I did not.

Q. That's something you could have done. Correct?

A. Possibly.

Q. The reason you did not do a calculation based on saved [sic] hygiene or maintenance costs is because you assumed that hygiene or maintenance is not a solution for internal PIM. Correct?

A. That's correct. It doesn't -- my understanding is that site hygiene is not a universal and perfect solution for internal PIM. That's correct.

Q. So we talked -- you were here for opening statements?
A. I was.
Q. And you remember me saying that evidence is going to be like two ships passing in the night?
A. I recall that, yes.
Q. So AT&T says the way we cure internal PIM is through site hygiene and maintenance. You understand that?
A. I understand that, yes.
Q. And you say, I don't think that's a solution and my assumption is that's not a solution. Correct?
A. We've seen -- there's been evidence that that's not the solution, the universal solution to it.
Q. Okay.
MR. DACUS: Your Honor, may I approach the flip chart?
THE COURT: It's right there. Feel free to use it.
MR. DACUS: Thank you, Your Honor.
Q. (BY MR. DACUS) So what I'd like to do, Doctor Bazelon, is sort of keep a running record of some assumptions you made. Does that sound fair?
A. Sure thing.
Q. And your first assumption, sir, is that site hygiene is not a solution for internal PIM. Correct?
A. That it can't cure all of it is my assumption.
Q. Well, can you tell us how much of it it can cure?

A. No.
Q. You didn't even do that calculation to determine it, did you, sir?
A. No.
Q. In a situation where you're trying to determine how much benefit we get from PIM cancellation, you didn't even make a calculation to see how much of it site hygiene cures, did you, sir?
A. No.
Q. Your assumption in this case went a little further than that, didn't it, sir? Your assumption was that site hygiene cures external PIM. Correct?
A. Site hygiene is what you -- my understanding is that that's what you use to cure external PIM.
Q. Okay. You agree that's an engineering question. Correct?
A. Yes.
Q. And as between you and the engineers at AT&T, who would know more about how they cure PIM through site hygiene--you or them?
A. I assume they know their network better.
Q. You would agree, sir, at the end of the day if this jury determines that AT&T, in fact, attempts to or prevents or cures internal PIM through site hygiene, as opposed to buying spectrum, then the amount of reduced cost that they receive or

don't incur as a result of PIM cancellation would be an appropriate measure of damages. Correct?
A. I can't agree with that statement.
Q. That's because you know the amount of costs that they incur is very small compared to $116 million. Isn't that true?
A. No, because you had in there the premise they were buying spectrum as an alternative, and that's not my assumption.
Q. Okay. I'd like to spend a little bit of time with you talking about what we think the facts and evidence are that you should have looked at and the methodology you should have used. Does that sound fair?
A. Okay.
Q. Okay. And we talked about one, and that is, because we cure PIM -- internal PIM through site hygiene or maintenance, we think you should have measured the amount of costs that are saved by using PIM cancellation. Do you understand that?
A. I understand that's the position that you've taken.
Q. And you've agreed with the jury you did not make that calculation. Correct?
A. I don't take that position. I did not make that calculation.
Q. Now, you know sort of in patent damages that one place you look to determine the value or the amount that would have been negotiated are licenses for the patents that are in suit.

Correct?

A. Correct. That's a very standard first step in looking at a reasonable royalty.

Q. You remember you put up those *Georgia-Pacific* factors 1 through 15? Do you remember that?

A. I sure do.

Q. Number one was licenses to the patents-in-suit. Correct?

A. Correct.

Q. You didn't say a word to the jury about licenses to the patents-in-suit, did you, sir?

A. I did not.

Q. Okay. So let's talk about. Sound fair?

A. Sure.

Q. And it's your understanding that's what the law requires. True?

A. That's one of the factors you're supposed to consider. And as I indicated on that slide, I considered it and did not find it helpful for determining the royalty so it wasn't part of my -- the analysis that I did present.

Q. And let's put this in context. If -- let's go back to house buying. If I was going to buy a house in a neighborhood, one indication of the value of that house would be what that house had sold for in the past. Do you agree?

A. Correct. Well, actually not what that house had sold for. It would be what its neighbors sell for.

Q. Why not look at the one you are buying? If the house that I'm buying has been sold in the past, why shouldn't I look at that very house to see how much it was worth to determine if I'm paying a fair value? Doesn't that sound common sense? Correct?
A. Well, it obviously depends on when it was last sold. So I could give you an example of a house that I'm -- my mother's house that I'm trying to figure out how much it's worth.
She bought it 10 years ago. It was much less worth when she paid for it. It was much less than what it's worth today. And if I buy that house from her today, I'm not going to pay her what she paid for it 10 years ago. I'm going to pay her what it's worth today.
Q. You might have to make some adjustments.
A. Yes. And in that case a lot.
Q. Okay. And let's be clear we're talking about a license. A license is just permission, someone paying for permission to use the patent. Correct?
A. Typically that's what it entails.
Q. Okay. And so, for example, these two patents, if someone wanted permission to use the '134 and the '775, they could pay a license amount to use those patents. Correct?
A. Correct.
Q. A royalty.
A. We're estimating the reasonable royalty that the law

suggests we do to calculate damages.
Q. You agree, sir, that one of the best places to look for to determine whether or not a patent has value is if and how much that patent has been licensed for in the past. Correct?
A. That is one of the things we look for in determining -- in trying to determine a reasonable royalty.
Q. In fact, what you said, and we can look at it if you want, in your report is that is a strong indication of a patent's value. Correct?
A. Yes, it's one of the common things that we look at.
Q. So in this case, we know the law says, go look at licenses for the patents-in-suit, you've told us that's a good place to look to see what the marketplace says, and here no one has ever licensed either of these patents, have they, sir?
A. They haven't and that's why, in part, that I took the approach I did to figure out at the hypothetical negotiation what would be in the minds of the parties.
The point you're making, I think, is that when there's another license that's comparable, that's what they start with in the negotiation.
Q. The point I'm making, sir, is the '134 Patent was issued in 2008. Correct?
A. I believe -- I'd have to look at the date, but sure.
Q. 15 years ago. Correct?
A. Okay.

Q. That's a patent that your side says is very important to the telecom industry, very important to telecom makers, and very valuable. Correct?
A. Correct.
Q. And yet no one, no one, has licensed that patent in 15 years. Correct?
A. Yes, that's correct.
Q. And it's true for the '775. It's been in existence for seven years, and no one has taken a license to it. Correct?
A. Correct.
Q. And it's true, sir, Mr. Smith told us from the stand, he's been willing to license these patents since the day they issued. True?
A. I suspect what he told us implies from the day they issued, sure.
Q. He said he'd been to more people than he can remember, trying to get them to take a license or partner with him or build a product with him. Correct?
A. I believe he was talking about when he started Finesse. But, yes, he described making an effort to license.
Q. No, sir, he didn't just -- he didn't just go to folks when he started Finesse. He's been going to folks since he started Finesse in 2001 up through now, and no one has agreed to take a license or partner with him or build a product. That is a true statement. Correct?

A. I believe that's a true statement, yes.
Q. And he's been to IBM to Sprint to Qualcomm. We could go on for dozens and dozens of other people. Correct?
A. I don't recall the specific companies. But, yes, he testified he had talked to many companies.
Q. And so if we take what you told us earlier, that common sense tells us go look in the marketplace and see what people think about this and whether or not they take a license, the fact is no one in the marketplace has seen value in it to take a license. That's a true statement.
A. I wouldn't agree with nobody's seen value in it. I would agree with the factual statement that nobody has taken a license.
Q. Are you familiar with the term 'put your money where your mouth is'?
A. I am.
Q. Nobody's paid any money for these patents or to license them. Correct?
A. As far as I know, yes.
Q. I think Mr. Smith said he'd been to a bunch of VCs. Do you remember him saying that?
A. I don't recall the VCs, but I'll take your word on it.
Q. VC means venture capitalists?
A. Correct.
Q. Those are people who are in the business of taking risk

and paying money. Correct?

A. That's correct.

Q. He's been to a bunch of VCs, and all those risk-takers said thanks, but no thanks. Correct?

A. I don't know the details of the negotiations. What we know is that no license pursued.

Q. Okay. So here we are again in that situation where we're two ships passing in the night. Correct? Your side says this thing is worth a lot of value, we say, no, it's not worth a lot of value, and the people on our side are also all the people in the marketplace. Correct?

A. I would not represent that the people in the marketplace have said there's no value. All we know is that you say there's no value and there's no license issued yet.

Q. We've already talked about the Judge said the jury has to determine credibility and reliability of each side's presentations and evidence. Correct?

A. Correct.

Q. So Finesse's paid expert and Mr. Smith say this stuff is very valuable, you can't live without it, PIM is everywhere, and it's worth tens of millions of dollars. Correct?

A. That's the -- I think it's worth tens of millions of dollars, yes.

Q. The marketplace, not AT&T and Nokia, but third parties who have no dog in this fight whatsoever have said, we're not

taking a license, we don't see the value of it. Fair?
A. There's no examples of a license being negotiated.
Q. Okay. I want to talk about one specific offer that Mr. Smith made, and he touched on it yesterday to Intellectual Ventures. Do you remember that?
A. I do.
Q. Now, you know who Intellectual Ventures is?
A. I do, and I believe I talked about it in my report.
Q. Okay. You know Intellectual Ventures is a very sophisticated patent purchasing company. Correct?
A. They are a patent -- yes. That's fair.
Q. Okay. They're in the business of purchasing patents and then attempting to go monetize or make money on those patents usually by filing lawsuits. Correct?
A. I don't know -- I don't want to characterize it as usually by filing lawsuits, but that is one of the ways that they monetize.
Q. They have lots of experience in looking at lots of patents. True?
A. I suspect they would.
Q. Way more than you have. Correct?
A. I'm sure they've looked at more patents than I have.
Q. So what Mr. Smith told us and what we know from the evidence is that Finesse offered in 2011 to sell its entire portfolio, that was five patents, it included the '134 and the

775, to Finesse for $3 million. Correct?
A. To Intellectual Ventures, I think you mean.
Q. If I misspoke, I apologize.
A. Yeah. I believe that's correct.
Q. Okay. So let me make sure my question's clear. It won't be the first time I probably misspeak and I apologize.
THE COURT: Just ask it again.
MR. DACUS: I will, Your Honor. Thank you.
Q. (BY MR. DACUS) In 2011 Finesse offered to sell its patent portfolio to Intellectual Ventures for $3 million. Correct?
A. I've seen that evidence, yes.
Q. And that patent portfolio was five patents. Correct?
A. That's correct.
Q. $600,000 a patent roughly. Correct?
A. If you divide it through. I don't know that that's quite how the -- that's quite the way to value them individually.
Q. Those patents included the '134 Patent that we're here about. Correct?
A. I believe it did.
Q. And it included the '775 Patent application. Correct?
A. I believe it did.
Q. And this very sophisticated business, Intellectual Ventures, said thanks, but no thanks. Correct?
A. All I know is they didn't come to an agreement and didn't

license it.
Q. They did not license it, did they, sir?
A. That's my understanding.
Q. We also know from what Mr. Smith said yesterday that in 2016 Finesse offered to sell their license to IV again. Correct?
A. I think he said that they -- he started an inquiry about that. I don't know that they got to an offer. I just don't recall that from his testimony.
Q. So you remember, first of all, he said, I didn't remember doing this. You remember that?
A. Yes.
Q. And then when shown documents, he remembered that indeed he made an overture and an offer to sell to Intellectual Ventures his patents. Correct?
A. I remember the overture. If there was an offer in there, I missed it. But I accept.
Q. And this is at a time where Mr. Smith claims that now PIM has become a huge problem for the telecom industry. Correct?
A. Yes, that it's grown over time, and by 2015 it was a bigger problem than it was earlier, bigger problem today.
Q. And, again, Intellectual Ventures, this sophisticated company that's in the business of buying and licensing patents, said thanks, but no thanks for a license. Correct?
A. I -- they did not come to an agreement on it. That's

correct.
Q. So one reason I ask you those questions is you said at the very beginning of your testimony, well, he reached out and made overtures to these people at the beginning of Finesse. The truth is he's done that throughout the entirety of Finesse's existence. Correct?
A. That's correct. The -- my comment on the beginning was you were quoting him on the countless businesses he reached out to, and I recollect him describing that as what he did at the beginning.
Q. Okay. I want to pause just for a second here on this -- on this issue. Well, let me wrap it up by this. You agree that one of the things you're supposed to look at are licenses, whether or not these patents have been licensed, and the facts here and the evidence are there's been no license taken. Correct?
A. Correct. I did look for licenses and found that there had been none to use as a starting point.
Q. Okay. I want to ask you and talk to you, if I could, about this issue of whether or not PIM is really a problem for the telecom business and telecom industry. Is that okay?
A. Sure.
Q. You know who Verizon is?
A. I do.
Q. Verizon is a telecom service provider. Correct?

A. One of the big three.
Q. Okay. You know that Verizon actually buys these very same Nokia Galaxy radios. Correct?
A. They buy some of the same ones, yes.
Q. And you know from the work you've done in this case that, in fact, Verizon bought more than a hundred thousand Galaxy radios from Nokia. Correct?
A. I don't recall a specific number, but, yes, they bought a lot.
Q. Well, do you dispute they bought over a hundred thousand?
A. Nope.
Q. You know that Verizon has not turned on this PIM cancellation feature in any of those hundred thousand. Correct?
A. I recall that they turned them on in some, but it was fewer than in AT&T's network.
Q. We're talking about less than five percent had it turned on. Correct?
A. I don't recall the number, but it was a smaller number, and under five percent I can accept.
Q. Okay. So if we're just -- do you agree, sir, that common sense is something, as the Judge told the jury in their instructions, they should be using?
A. I hope so.
Q. Okay. So Finesse and Mr. Smith and you say PIM is

everywhere now, it's a problem, it's been a problem since 2011, it's exacerbated more starting 2016 but Verizon has a hundred thousand of these and they're operating their network without turning on the PIM cancellation. Correct?
A. They're using it some, but much less than -- many fewer percentage than AT&T has chosen to turn it on. That's correct.
Q. And just so we're not -- we're clear, when you say many fewer, you would agree with me in more than 95 percent of them, Verizon does not have the PIM cancellation on. Correct?
A. I believe that's correct.
Q. I'd like to ask you some questions about the details of that calculation that you went through with us, if that's okay with you.
A. My damages calculation.
Q. Yes, sir.
A. Yes.
Q. Your spectrum calculation. Is that okay?
A. Sure.
Q. You already know that we think that's the wrong measure of damages. Right?
A. You -- yes.
Q. Okay. But that's the jury's decision, not mine. Fair?
A. Correct.
Q. So what I'd like to do is spend a little time with you

talking about if they believe that's the correct method to measure damages, whether or not your calculation is correct. Can we spend a little doing that?
A. Sure.
Q. All right. So just so we're clear, any benefit that AT&T receives from this PIM cancellation feature, that's what you need to be measuring. Correct?
A. Yes. The expected benefit from the time the negotiation of deploying and using the cancellation technology.
Q. Okay. And specifically we know that these products cancel internal PIM so we need to measure that. Correct?
A. That's what their intended design for, as we said.
Q. Now, in making your calculation, you assumed, and I'm going to quote you, where PIM-C, that's PIM cancellation, was enabled in the Nokia radios, it must have been the case that there was PIM present. That was your assumption when you did your calculation. Correct?
A. That was an assumption about the mindset at the time of the negotiation. It was not a statement about the deployment of AT&T's network today.
Q. So in your calculation you made an assumption that where PIM cancellation was on in these radios, that PIM was present. That's a true statement.
A. Yes. As I said, the actual deployment is what I used as the expected deployment.

MR. DACUS: Your Honor, I'm going to object as non-responsive.

THE WITNESS: I apologize.

THE COURT: Just a moment. Overruled. I think he's attempting to respond to your question fairly.

MR. DACUS: Thank you, Your Honor.

Q. (BY MR. DACUS) When you did your calculation, Doctor Bazelon, you assumed that if the PIM cancellation feature was turned on in the Nokia radio, that PIM was present. That's true.

A. I modeled the value of it being turned on as being -- PIM being prevented when it's turned on. That's true.

Q. So I'm going to write that as one more of your assumptions on this flip chart.

MR. DACUS: If I can have leave to go to it, Your Honor.

THE COURT: You may.

MR. DACUS: Thank you.

THE WITNESS: To be clear, that's an assumption about the --

THE COURT: Just a minute, Doctor Bazelon. He needs to ask the question and you need to answer the question. And then when he's through, Ms. Fair will get to ask any follow-up questions she wants. But you're here in a responsive posture.

THE WITNESS: Thank you.

Q. (BY MR. DACUS) And I'm going to give you an opportunity, sir. So here's what I think you're trying to say. When you did your calculation, this was your assumption at the time of the hypothetical negotiation. Correct?
A. Correct.
Q. You now know that's incorrect, don't you? Based on actual data and actual facts, you know that assumption is wrong and that's what you want to tell us. Isn't that true?
A. No.
Q. Okay.
A. I don't know that assumption was wrong.
Q. Do you still hold the assumption -- I want to be very clear. As you sit in that seat today under oath, your assumption and your belief is that the facts and the evidence are that if PIM-C is on, that PIM is present. Is that what you believe?
A. I don't know from AT&T -- in AT&T's network if every radio where PIM-C is on today has PIM. I don't know that. I know that using that set of radios and trying to estimate the value from the time of the negotiation, my assumption was that it would be turned on where there was a problem.
Q. So what you just said to the jury is, under oath, you don't know where PIM-C's turned on if PIM is present or not, but what you just spent an hour showing them is you calculated a value and a damage for all 64,000 radios. Correct?

A. All 64,000 radios are infringing the technology and I apply the per radio royalty rate that I calculate to the ones that are -- where the switch is turned on, the two switches are turned on, and they're practicing it.
Q. Right. You just calculated damages for all 64,000 radios, and just 30 seconds ago you just told the jury, I don't know if PIM is present or not. Both of those are true statements. Is that correct?
A. That is correct.
Q. And yet what we're supposed to be valuing is the value of PIM that gets canceled. True? You don't even know if it's present. Isn't that fair?
A. The value of it when it's canceled is my estimate of the per radio royalty rate which is then applied to the actual radios that are using the technology.
Q. Well, what you put in your report, sir, is the fact that PIM cancellation was on, you took as a, quote unquote, hint there was a PIM problem. Isn't that true?
A. I don't recall the word hint, but I believe you if it's in there.
Q. Actually, you gave a deposition in this case, did you not, sir?
A. I did.
Q. And you remember the Judge instructing the jury that depositions are given under oath. You took the same oath that

you did here?
A. I did.
Q. You have your deposition there in front of you. If you can turn to page 190. And if you look at lines 4 through 11 on that page and let me know when you're there?
A. I'm there.
Q. Does that refresh your recollection that you said, if PIM-C was on, that was a, quote, hint to you that there was a PIM problem?
A. Yes, that the fact that AT&T used the technology in the specific instances where it used the technology, there was a reason for using it.
Q. Were you here when the Judge read what the burden of proof is when you're asking for tens of millions of dollars?
A. I was.
Q. Did he say it was to have a hint?
A. I think that mischaracterizes what this means.
Q. It's a little higher than a hint. You would agree with that. Correct?
A. I agree that the burden of proof is higher than a hint. I hope it is.
THE COURT: Let's get back to the facts what the burden of proof is I've instructed everybody on.
MR. DACUS: Thank you, Your Honor.
Q. (BY MR. DACUS) You agree, sir, that as you sit here

today, do you know that there are cell sites and radios where an internal PIM problem will never arise? Correct?
A. I don't know that.
Q. Can you pull up in that same deposition, sir?
A. Yep.
Q. Can you turn to page 119? And can you look at lines 10 through 14, please, sir? Let me know when you've had a chance to read it.
A. I've read it.
Q. Does that refresh your recollection that under oath you said there are cell sites and radios where PIM problems will never arise?
A. That doesn't characterize what's here. Sorry. What it says here is -- the question I'm answering is, And there will probably be some radios in the network where PIM problems don't arise for that particular radio during its lifetime. Is that fair?
And I said, Likely true, yes.
Q. So you admit -- although you calculated damages on all 64,000 radios, you admit under oath that there are in your words 'likely, yes' radios for which there will never be an internal PIM problem. Correct?
A. Correct. And -- yes. Correct.
Q. And you're here and you've asked the jury to award a royalty for every single one of those 64,000 radios. Correct?

A. Right. Those are not all of the models of these radios. Those are only the models of these radios where AT&T has deployed the PIM-C, the PIM canceling technology. That's correct.

Q. You now know, sir, that based on information you've seen in this case, that internal PIM is present in radios on the AT&T network in substantially less than two percent of the radios at any given time. Correct?

A. I have seen that statement made by Doctor Becker, but I don't know that to be true.

Q. Do you know who Mike Taylor is?

A. I forget his title, but I do know who you're talking about, yes.

Q. Mike Taylor is an engineer at AT&T with responsibility for PIM and internal PIM. Correct?

A. That's my recollection.

Q. And you know he's done tests to determine if internal PIM is present and at what rate. Correct?

A. I know he's done some tests.

Q. And you know he did them before this lawsuit was filed. Correct?

A. I don't recall the tests he did before the lawsuit was filed. Sorry.

Q. At the time that you did your report in this case, that you made your calculation, you had access to Mike Taylor's

sworn deposition testimony about PIM and whether or not it was present. Correct?
A. I had access to his testimony.
Q. And so you had access to the engineer at AT&T responsible for internal PIM with knowledge about whether it's present and to what extent, and the truth is, sir, you did not bother to read his deposition to find out what he said. Isn't that true?
A. I did not read his whole deposition. My staff did.
Q. You did not read it, did you, sir?
A. Not personally, but as I said, my staff read it.
Q. So there you sat doing a calculation that says we owe tens of millions of dollars, there's sworn testimony and information from the engineer at AT&T who knows whether PIM is present, testified whether PIM is present, and you did not bother to read it. That's a true statement.
A. I did not read his whole depo. I was aware of his testimony. And as I said, my staff read it, and I was aware of what he said.
Q. I want to talk about some of the information that went into your calculation specifically.
MR. DACUS: May I have the document camera, Ms. Brunson?
Q. (BY MR. DACUS) On your direct examination you remember showing the jury this measuring of PIM performance and the

amount of decline?
A. I do.
Q. And you used this to calculate the alleged spectrum that you salvaged related to this PIM cancellation feature. Correct?
A. It was used in the calculation, yes.
Q. Okay. Now, do you know, sir, and you didn't tell the jury, that this data and information actually relates to a product that is different from the Nokia product in this lawsuit? Correct?
A. It was developed during a test of it, but I don't use the information about that product in this analysis.
MR. DACUS: Object as non-responsive, Your Honor.
THE COURT: Sustained. Ask your question again.
MR. DACUS: Thank you, Your Honor.
Q. (BY MR. DACUS) You know that the information that you utilized relates to a product different from the Nokia product. Correct?
A. Correct.
Q. It relates to a product made by Ericsson, a different manufacturer. Correct?
A. Correct.
Q. And the name of the product is called P614. Correct?
A. There is nothing about the P614 product in these test data that we're looking at here. So I appreciate that it was

developed during a test of that product, but it's not a test of that product that I'm using.

Q. It's not the Nokia product at issue in this case, is it?

A. That's correct.

Q. You agree, sir, that the Ericsson P614, you assumed, cancels internal PIM. Correct?

A. I believe that was correct.

Q. Okay.

MR. DACUS: So with Your Honor's leave, I'd like to write that here.

THE COURT: That's fine. You may use the chart as you wish without asking leave each time.

MR. DACUS: Thank you, Your Honor.

Q. (BY MR. DACUS) You now know, sir, I assume, that this P614 product actually relates to cancellation of external PIM. Correct?

A. I believe that's correct.

Q. So although you assumed when you did your calculation it was internal, you now know it relates to external. Correct?

A. The calculation had nothing to do with the P614, so I -- the statements you're saying are true but not in the way you're suggesting.

Q. Can you pull up your report, please, sir? And if you would turn to page 30, please. Let me know when you're there, please.

A. I'm there.
Q. Look at paragraph 59.
A. I'm there.
Q. And look at the second sentence, please. It says, To estimate the general relationship, I rely upon PIM cancellation filter trial data produced by AT&T. Do you see that?
A. I do.
Q. The filter --
MS. FAIR: Objection, Your Honor. He needs to give the witness a chance to refresh his recollection before he reads to the jury from the report.
THE COURT: Sustained.
Q. (BY MR. DACUS) Does that refresh your recollection, sir, that you utilized in order to calculate the amount of spectrum salvaged filter trial data produced by AT&T?
A. It was trial data about these filters, but the data I used was not about the filters from the trial; it was a different part of the data set in that trial. And to say that P614, whether it's internal, external, or however, affects the two charts you put up of the data I used from that is just incorrect.
Q. You agree, sir, that what you were measuring, at least in part, was the amount of throughput? Correct?
A. Correct.

Q. So do you agree that internal and external PIM affect throughput differently?
A. My understanding is that PIM is measured by the amount of noise created and its source doesn't affect its effect on throughput. It's the level of noise, the dB.
Q. So to be clear, your assumption is the source, whether internal or external, has the same effect on throughput. Correct?
A. If it's the same amount of PIM, it will have the same effect on throughput.
Q. You agree, sir, that's an engineering question?
A. Engineering or physics, but, yes, ultimately.
Q. Not an economics question.
A. It's not -- yes, it's not an economic question. That's true.
Q. Okay. You, in the course of your testimony, showed us this slide.
MR. DACUS: May I have the document camera, Ms. Brunson?
Q. (BY MR. DACUS) You showed us this slide to show that within your calculation, you assumed three radios per AT&T cell tower or cell site. Correct?
A. That's incorrect.
Q. So the number 3 here, what does that represent?
A. That to cover a cell site, there's three -- as anybody in

the industry knows, there's three sectors, and it takes three radios to cover all of the population covered by a single cell site. That's not saying it takes -- that there's only three radios on a cell site.

Q. So you admit there's more than three radios on a cell site or cell tower?

A. We all know there's more than three radios on most cell sites.

Q. I want to ask you about the ultimate damages calculations in this case so that we're clear on those, if that's okay.

A. Yep.

Q. So let's just start with the 166 and the 96 numbers. All right?

A. Okay.

Q. Let's focus right here and right here. That's damages that you're attempting to assess that go beyond this trial date. Correct?

A. Correct.

Q. That's damages that, just like we talked about, for each and every radio for every year after this trial up to the expiration of the patent. Correct?

A. Of the radios that are currently using the technology, yes.

Q. You don't know if AT&T will turn off this feature after this trial, do you, sir?

A. True. I don't know if they'll use it more or less or -- I don't know exactly how that would change.
Q. And if they turned it off, you agree there are no royalties or damages owed. Correct?
A. Correct. The royalties are applied to the usage of the technology. And if you stopped using it, the royalties would stop.
Q. All right. In addition, for these numbers, this 96 and 166 million, all you did is add up -- you took the 64,000 radios times the amount that you say is owed per radio and multiplied it by the number of years until expiration. Correct?
A. Correct.
Q. Now, you spent some time earlier telling the jury about the time value of money. You remember that?
A. Yes.
Q. So that essentially says a dollar in the future is worth less than a dollar today. Correct?
A. Correct.
Q. So you didn't discount these numbers -- well, let me back up. The hypothetical negotiation occurred in 2018. Correct?
A. Correct.
Q. And your $166 million number goes all the way out to 2029. Correct?
A. Correct.

Q. You didn't discount -- having told the jury about the time value of money, you didn't discount that number back to 2018, did you, sir?
A. I didn't, but I also didn't have a factor in the per radio per year royalty rate that would increase over time that is actually a common feature of licensing agreements.
Q. You didn't discount this number back, did you, sir?
A. Correct.
Q. Now, the per unit royalties as of the dates of this trial are the 62 million and the 58 million. Correct?
A. Yes. As of last week.
Q. I want to wind up with you and talk to you a little bit about what we said earlier and you said you sure hope so and that is about common sense. Can I ask you some questions about that?
A. Please.
Q. All right. You know, sir, that AT&T uses both Ericsson and Nokia radios in their network. Correct?
A. Yes.
Q. And you know that AT&T actually has over 700,000 Ericsson radios in the network. Right?
A. I didn't recall the specific number, but that sounds reasonable.
Q. You know that roughly 70 percent of the AT&T network is made up of Ericsson, not Nokia, but Ericsson radios. Fair?

A. That's my understanding.

Q. And you know that those Ericsson radios do not have PIM cancellation. Correct?

A. They don't have it built in. That's correct.

Q. So here we go back to two ships passing in the night--Finesse and you saying PIM is present, it's important, it's a problem, PIM cancellation is required, and yet 70 percent of the AT&T network has radios that do not even have this feature. Correct?

A. We say it's valuable.

Q. And you have no evidence to present to this jury that the AT&T network has greater internal PIM problems than that 70 percent serviced by Ericsson versus Nokia, have you, sir?

A. I have not seen any evidence on that.

Q. In other words, just common sense would tell us if this Nokia PIM cancellation is so important and so vital, we just compare what the Nokia internal PIM problem is versus the Ericsson PIM problem. Correct?

A. I'm not sure I follow that.

Q. Okay. You don't have any evidence to say that the part of the network that includes Ericsson radios has any more internal PIM than the part that's serviced by Nokia radios, do you, sir?

A. I don't have the evidence that it has more than the parts serviced by Nokia radios, that's correct.

MR. DACUS: That's all the questions I have, Your Honor. I pass the witness.

THE COURT: All right. If you'll return that chart where it was.

Is there additional direct, Ms. Fair?

MS. FAIR: Yes, Your Honor.

THE COURT: All right. Let's proceed with redirect.

End of file 14.

REDIRECT EXAMINATION

BY MS. FAIR:

Q. Doctor Bazelon, we heard Mr. Dacus ask you several questions about site hygiene and that site hygiene maybe can fix this problem and criticizing you for not looking at the cost of site hygiene.

Are you aware, in having heard Doctor Wells' and Mr. Smith's testimony about the available options for dealing with PIM, whether site hygiene has been an option for a long time?

A. One of three that I remember hearing posed, and it's been around I'm sure for a while.

Q. And if site hygiene were something that fixed all these PIM problems, if it were this magic alternative to PIM cancellation that's accused in this case, do you think AT&T would be using only site hygiene?

A. It would depend on the costs and trade-offs, but I don't know if they would only use it.

Q. If they're using site hygiene and then they start using a new technology like PIM cancellation in 2018 and it's done, as we heard the testimony yesterday, in conjunction with Nokia and AT&T working together to fix this problem, if site hygiene fixed all of that, do you think that they would have gone to all this effort to come up with this PIM cancellation technology?
A. No. If site hygiene had fixed the problem, it wouldn't be a problem to have fixed with PIM-C.
Q. And we saw the spreadsheet that you showed us to look at which radios actually have PIM cancellation turned on. Right?
A. Correct.
Q. And so we know that for AT&T to turn on PIM cancellation, they have to actually turn it on. Right?
A. That's my understanding.
Q. So they had to do something to actually use the technology.
MR. DACUS: Your Honor, I object to leading.
THE COURT: Try to avoid leading, counsel.
MS. FAIR: Yes, Your Honor.
Q. (BY MS. FAIR) So would AT&T have to do something to use the PIM cancellation technology?
A. Well, they'd have to turn on -- as -- in that inverted pyramid of steps I took, it showed that they don't turn it on in almost a third of their -- in quite a number of their

radios, they haven't turned it on. So when they turn it on, it's a choice to turn it on.
Q. And if they have this choice of whether or not to turn it on, if they had site hygiene fixing all the problems, do you think they would be turning it on this often?
A. It wouldn't make sense to be using a technology that was doing nothing.
Q. Doctor Bazelon, Mr. Dacus criticized your qualifications for the work that you did in this case, and I want to ask you -- he criticized you for not having actually sat down and negotiated a license before. Do you remember that?
A. I do.
Q. Now, in this case, the law requires you to look at the hypothetical negotiation?
A. Correct.
Q. As an economist, do you have experience hypothesizing what negotiations would look like?
A. Yes. There's a whole branch of economics called game theory, which is formally modeling how parties would agree or disagree on things, and it's a type of game theory, that alternating offer model, that I use that I applied to take an economist's model of what the actual negotiation would have been.
Q. And is that something you do often?
A. Yes.

Q. How long have you been doing this type of hypothetical negotiation analysis?

A. I think the first graduate school class where I was taught this was in 1989.

Q. Doctor Bazelon, we also heard some criticisms about the assumption of infringement and validity in your analysis. It kind of sounded to me like Mr. Dacus was suggesting you made that up.

Are those assumptions that you yourself personally assumed for the analysis?

A. No. As noted, the legal precedent is that you want to imagine what the parties would have negotiated had they sat down to negotiate before the first infringement, but with a couple of legally imposed assumptions. One is that both parties agreed that the patents were valid and infringed, and that both parties were -- had an intent to come to an agreement.

Q. And are those assumptions that the Defendants' damages expert, Doctor Becker, also makes for his analysis?

A. In his royalty analysis, yes, he assumes that, yes.

Q. We also heard about the negotiations with Intellectual Ventures. Did Intellectual Ventures have access to all of the detailed confidential information that you had in this lawsuit?

A. No, not at all.

Q. Like the testing data of Nokia running tests on the very models at issue in this case to show how effective they are?
A. I think they would have only had access to what was publicly known at the time and any information Finesse had, but they wouldn't -- you would not have expected them to have access to any Nokia testing, AT&T testing, or other data such as that.
Q. If you're looking at what somebody should pay for a royalty to use technology or for a royalty on anything, like ExxonMobil drilling for oil on your land, do you think that somebody's negotiations for the price to purchase that property a couple of years before that would somehow limit what Exxon has to pay you for the oil?
A. No. It's the value at the time of the negotiation that's relevant.
Q. We also heard in your cross examination about how much Verizon uses PIM cancellation, and we heard about AT&T's use of Ericsson equipment and whether that uses PIM cancellation. I want to talk a little bit about that.
Were you here in opening statements when Mr. Dacus said that AT&T would know whether and to what extent it's experiencing the PIM problem?
A. Yes.
Q. And were you here when Doctor Wells explained that PIM is a problem that arises based on what frequencies you're using

and how you're combining them in the cellular traffic on your network?

A. That's my understanding of what PIM is is the combination of specific frequencies.

Q. And in your experience in the cellular industry, can you tell us what -- whether Verizon and AT&T's spectrum holdings would be identical so, of course, they'd have the same problems?

A. Well, in fact, they could not be the same in the sense that when a band like the auction we saw of the AWS3 spectrum that was sold, Verizon would have bought some of those licenses, AT&T would have bought some different ones, but it would never be the case that they would both have the same spectrum and the same geographic area.

Q. And for AT&T having deployed Nokia equipment in some places and Ericsson equipment in others and deciding to use PIM cancellation in some areas and not in others, do AT&T's spectrum holdings and the frequencies on which they're carrying data look identical market to market to market across the country?

A. No, they vary, as I showed in that one graph of the U.S., that they might own more or less of a given frequency range depending on the geographic market.

Q. And so is it correct when Mr. Dacus suggested that if we need to know how important PIM cancellation is to AT&T in

these radios in these markets, all we have to do is look at what Verizon's using, is that a fair comparison; that's all we have to do?

A. I don't see the analogy that he was trying to make. I don't see what Verizon's deployment has to do with AT&T's network.

Q. And what about Ericsson? All we have to do is just look and see what AT&T's doing with the Ericsson equipment to know if PIM is a problem where they're actually deciding to turn on PIM cancellation?

A. No, because the PIM cancellation wasn't available in the Ericsson markets and I -- yeah.

Q. Mr. Dacus questioned you about all this -- we've been hearing about that AT&T has this proof that only two percent of radios have a PIM problem and he criticized you for calculating damages on all 64,000 units. You were here when Doctor Wells testified earlier today?

A. I was.

Q. And you heard him testify that there are method claims and apparatus claims in this lawsuit?

A. Correct.

Q. And so when you're assessing damages, what is your understanding of what it is to infringe this patent, when infringement is taking place?

A. Well, the way I've interpreted in my analysis is it's one

of the accused models of radio heads when the technology covered by the patent is activated in that radio head.
Q. So why is it then that you used all 64,000 radios when you're applying your rate to the damages analysis?
A. Well, however I came up with that royalty rate for dollar per radio per year, whatever that rate is, it clearly should be applied to the radios that are actually infringing, and those are the subset of these models where they've turned on the switch and those are the ones I counted for my damages analysis.
Q. And so if we were to not calculate damages on those 64,000 radios, then AT&T would be getting to infringe for free on all of those radios?
A. That -- any radio where they're using the technology that you don't charge them a royalty, that's them getting to use it for free.
Q. If you had a home alarm system, it's supposed to protect you from the problem of a break-in, can you go back to the monitoring company where you're supposed to be paying the subscription to at the end of the month and, you know, nobody broke in this month so I don't think I should have to pay?
A. No.
Q. You think you'd have to pay for it if you're going to turn it on?
A. The principle here is there's a technology described by

the patent, and when you use it, you should have to pay for it.

Q. And if AT&T is facing a claim for damages of this magnitude and they say, Well, we really don't even have this problem, you think they'd just turn it off?

A. If it really wasn't a problem, you do have to wonder why it's turned on in so many radios.

Q. Mr. Dacus questioned you about looking forward to what damages or what use there is after the trial.

MS. FAIR: Mr. Boles, can we have the last slide of Doctor Bazelon's presentation?

Q. (BY MS. FAIR) Now, Doctor Becker, the Defendants' damages expert, are you aware of his calculation of damages?

A. Yes.

Q. And he gives a single amount that's a fully paid-up license that includes all the future use.

A. That's correct. It's one number regardless of how much it's used or for how long it's used and so forth.

Q. And so if the jury, who decides the damages in this case, wants to award a single lump sum for all of the license term that would go all the way into the future, is that what you're calculating here through expiration in your damages calculations?

A. Yes. That's the idea this is getting at is if you wanted to figure out the value for the whole life of the patent and

do it in one lump sum payment, that's the number.

Q. And if the jury wants to award just through trial and then let AT&T decide whether to continue to infringe and continue to have to pay or choose to turn it off, you've given them the tools to do that as well?

A. Absolutely. The numbers calculated through trial are for the already past infringement, but the per radio per year royalty rate is something that I understand you could apply -- you could decide to apply on a going-forward basis, and if AT&T really gets no value from using this technology, they are free to turn it off and avoid paying the royalty.

Q. Doctor Bazelon, with this lawsuit having been pending for a year and a half, two years, in the face of this damages claim, has AT&T turned off the infringing technology?

A. To the best of my knowledge, they have not gone and turned off the radios.

MS. FAIR: I pass the witness.

THE COURT: Is there further cross?

MR. DACUS: Yes, Your Honor.

THE COURT: All right. Proceed with additional cross examination.

MR. DACUS: Thank you, Your Honor.

RECROSS EXAMINATION

BY MR. DACUS:

Q. Were you here for jury selection, sir?

A. I came in at the very end of it.
Q. Okay. You know that AT&T and Nokia have the right to defend themselves if they believe they don't infringe. Correct?
A. I hope so.
Q. Okay. They don't just have to turn the feature off just because someone makes an allegation against them. Correct?
A. It's your choice.
Q. And you know, sir, that what you're supposed to be doing is measuring the actual benefit to AT&T of this PIM cancellation. Correct?
A. I'm estimating the damages which are the royalties applied to actual usage, yes.
Q. Okay. So when counsel was asking you about PIM and where it's present, you can't cancel PIM unless PIM is actually present. Correct?
A. The technology -- yes, the technology works where you are canceling -- actually canceling it where it's active.
Q. So it does matter in what percentage of these AT&T radios PIM is actually present so that you can measure the actual benefit. Correct?
A. No.
Q. Okay. We'll just agree to disagree there. Does that sound fair?
A. Okay.

Q. You remember that counsel, Ms. Fair, asked you some questions about the difference between Verizon and AT&T? You remember that?
A. Yes.
Q. Now, you know that at least in part what internal PIM is created by is having dual bands in radios. Correct?
A. The products -- yes, the products at issue here are dual or tri-band radios.
Q. Correct.
MR. DACUS: May I have the document camera?
Q. (BY MR. DACUS) And you showed this to the jury earlier. One of the dual-band radios at issue here is this band that has bands 25 and 66. Correct?
A. Correct.
Q. You know, sir, from your work that Verizon operates in these same bands 25 and 66. Correct?
A. They operate in the same bands, but as I said, they don't operate on the same frequencies that AT&T would.
Q. They operate in dual bands, 25 and 66, which, according to you and according to the Plaintiffs, would create internal PIM. Correct?
A. They operate in these bonds in those swaths of frequencies, yes.
Q. And yet Verizon is not utilizing PIM cancellation and you're not aware of any problems that Verizon has. Correct?

A. Well, they are utilizing it; they're just not utilizing it to the extent AT&T is.
Q. Less than five percent of their radios. Correct?
A. I believe that's correct.
Q. Now, I want to make sure I understood your testimony with respect to these Ericsson radios that AT&T has in its network. Can I ask you a few questions about that?
A. Sure.
Q. You made some distinction about geographic region. It's not your position, sir, that the geographic regions in which these Ericsson radios operate, there is no internal PIM problem or even potential problem, is it?
A. It's not that there's no -- necessarily no PIM there. My understanding is that in AT&T's network market-by-market decisions, one market will be a Nokia market, another geographic area will be Ericsson, so there -- where those radios are are separate geographic areas, but I don't think that has -- that in itself has a bearing on the PIM.
Q. Right. There's no expectation that internal PIM would be different in Texas than it would be in California. Correct?
A. Certainly not because of it being in Texas versus California. That's for sure.
Q. Right. And yet 70 percent of the network is operating with these Ericsson radios that have no PIM cancellation. Correct?

A. That's right. They don't -- Ericsson doesn't offer that in their radio heads.

MR. DACUS: That's all I have, Your Honor. I pass the witness.

THE COURT: All right. Additional direct?

MS. FAIR: No, Your Honor.

THE COURT: All right. Then you may step down, Doctor Bazelon.

THE WITNESS: Thank you.

MS. FAIR: Your Honor, may this witness be excused?

THE COURT: Any objection?

MR. DACUS: No, Your Honor.

THE COURT: You're excused, Doctor Bazelon. You're free to stay with us. You're also free to leave. It's up to you.

THE WITNESS: Thank you.

THE COURT: Plaintiff call your next witness.

MR. WARD: Your Honor, Plaintiff calls AT&T to the stand.

THE COURT: All right. If AT&T's representative will come forward and be sworn.

(Whereupon, the oath was administered by the Clerk.)

THE COURT: Please have a seat on the witness stand, sir.

MR. WARD: Your Honor, could I have a moment to pass

up a couple of binders?

THE COURT: You may.

Mr. Loddeke, if you'd like to pour some water, help yourself.

THE WITNESS: Thank you, Your Honor.

THE COURT: Ladies and gentlemen of the jury, let me explain this to you. Because this witness is the representative of the Defendant being called by the Plaintiff, it's what's called an adverse witness which means the Plaintiff's counsel will examine him as if it was a cross-examination. And then when his own counsel, the Defendant's counsel, cross-examines him, it will be just as if it were a direct examination. There's a little bit of role reversal here. I just wanted to make you aware of it Go ahead, Mr. Ward.

MR. WARD: Thank you, Your Honor.

ADAM LODDEKE, SWORN,

testified under oath as follows:

DIRECT EXAMINATION

By Mr. Ward:

Q. Is it Mr. Loddeke?

A. Yes. It's Adam Loddeke.

Q. Mr. Loddeke, my name is Johnny Ward, and I represent Finesse Wireless in this case. I don't think we've had an opportunity to meet before, have we, sir?

A. No, we have not.
Q. You have been deposed in the case, though. Correct?
A. Yes, I have.
Q. You were deposed as the corporate representative and now you're also the corporate representative at trial. Correct?
A. That's correct.
Q. And you understand for all intents and purposes, you're AT&T, you speak on behalf of the company today. Correct?
A. Yes.
Q. Have you ever testified as a corporate representative before at trial?
A. Not in trial, no.
Q. Okay. During his opening statement, Mr. Dacus talked about the fact that AT&T and Nokia have thousands of patents. Do you recall that?
A. Yes.
Q. How you-all are innovators, and AT&T has got a lot of innovators. Correct?
A. That's correct.
Q. Nokia does, too. Correct?
A. Yes.
Q. You-all must have a lot of faith in the patent system to keep going back to the United States Patent and Trademark Office to keep applying for patents. Right? You've got faith in that entity.

A. Yes, we do.
Q. And to get a patent, it takes a lot of hard work?
A. Yes, it does.
Q. It takes time. Correct?
A. Yes.
Q. It takes money to get patents.
A. I would assume so, yes.
Q. You got to hire lawyers to do it.
A. Yes.
Q. And, in fact, I think you've got a patent application pending maybe?
A. Yes, I do.
Q. So you've got faith in the Patent and Trademark Office, don't you?
A. Yes, I do.
Q. If you get -- do you have a patent issued or is this your first one that you've applied for?
A. It's the first one I've applied for, yeah.
Q. If you obtain that patent, do you think you'll be proud of it?
A. Yes.
Q. Do you think Mr. Smith is right to be proud of his patents?
A. Yes, he is.
Q. So AT&T's got thousands of patents, it has faith in the

system, but it's its position in this trial that the Patent Office messed up on both of Mr. Smith's patents. Correct?
A. We feel we don't infringe on the patents.
Q. Well, but it's more than that, sir. It's not just that you don't infringe. In addition, you say the Patent Office messed up. They're invalid. You heard Mr. Dacus in opening say that. Correct?
A. I think AT&T will provide its case on that later.
Q. Well, but you understand, as the corporate representative, that's AT&T's position. Not only do you say, we don't use it, but even if we do, it's no good, the patents are invalid.
A. Yes.
Q. Right?
A. Yes.
Q. So different examiners at different times messed up on Finesse Wireless's patents. That's AT&T's position. Correct?
A. At this point in time, yes.
Q. So your first defense is we're not on the property. Right? We don't trespass. No infringement. That's AT&T's position. Correct?
A. Yes.
Q. But if you are on the property, the deed's no good, the patent's invalid.
A. I think there is -- you know, they'll put together a case

later for both scenarios where they feel that we -- we don't infringe and that we -- that there is some invalidity to the patents themselves.
Q. And if you're wrong on both, you only owe a million dollars.
A. Again, I think it's what AT&T believes is fair -- fair cost.
Q. You'd agree with me that it's not just AT&T and Nokia that have good ideas, though. Right?
A. Yes.
Q. Individuals can have good ideas. Right?
A. Yes, that's true.
Q. Mr. Smith, it's possible he had a good idea. Correct?
A. Yes.
Q. We also heard some comments about Finesse never making a product. You remember that?
A. Yes, I heard that earlier.
Q. You would agree with me as someone who's applied for a patent, you know that you don't have to make a product to obtain a patent, do you?
A. That's correct.
Q. So for anyone to suggest Oh, well these patents don't have any value because there's not any products that Finesse ever sold, those are two different things. Correct?
A. Yes.

Q. All right. Let me ask you about some statements that we've heard about AT&T's position with respect to PIM. Is that okay?
A. Yes.
Q. Am I understanding correctly that it's AT&T's position in this trial that it uses site hygiene to cancel internal PIM?
A. It is one of the tools in the toolkit to address internal PIM.
Q. Is PIM-C in the accused radios used to address internal PIM?
A. We have it enabled on some of the radios. We do believe it provides some value in a small percentage of cases.
Q. So let me see if there's an area that we agree on, and that is PIM-C in the radio does cancel PIM in some radios.
A. Yes.
Q. It's not like it's a worthless feature that does nothing. Correct?
A. That's true.
Q. And, in fact, you've seen documents describing the benefits of PIM-C, have you not?
A. Yes, I've seen Nokia documents that have.
MR. WARD: And Mr. Boles, if we could pull up PX 715.
Q. (BY MR. WARD) Do you know these individuals, Dan Edwards -- Mr. Edwards, he's one of the people that testified

by video deposition. Correct?
A. Yes, he did.
Q. And he sent this email in 2019 to Mr. Mike Taylor. Mr. Taylor is coming to testify. Correct?
A. Yes, he will.
Q. So you know both of these folks?
A. Yes, I do.
Q. All right.
MR. WARD: Let's flip to the next page.
Q. (BY MR. WARD) And this looks like a document from Nokia. Obviously it's being circulated within AT&T. Correct?
A. Yes, it would have been if both Dan and Mike have it.
Q. And this is one of the accused radios. The AHLBBA, that's the tri-band radio.
A. Yes.
MR. WARD: Next page.
THE COURT: Let me ask you, Mr. Loddeke, not to just use first names only. If it's Mike Taylor, say Mike Taylor or Mr. Taylor, but don't just call him Mike.
THE WITNESS: Sorry, Your Honor.
THE COURT: That will avoid any confusion in the record.
Continue, counsel.
Q. (BY MR. WARD) And there on the second page of this presentation from Nokia they talk about some of the features

for the tri-band radio. Correct?
A. Yes.
Q. And the second feature there is internal PIM cancellation feature for all three bands.
A. Yes, it states that.
Q. Nokia is telling you before there's a lawsuit filed that its tri-band radio has internal PIM cancellation for three bands. Correct?
A. Yes, that's what it states.
Q. Have you seen an email where someone at AT&T has written Nokia back and said, You-all have lied to us; these radios don't cancel PIM?
A. No, I have not seen that.
Q. In the thousands of pages of the documents, we're not going to see any documents where AT&T has corresponded with Nokia and said, We have bought over 60,000 radios, we've enabled PIM, and we've been defrauded; it doesn't work. Are we going to see that type of correspondence?
A. It's possible somebody would have questioned how effective the feature is, but again, I don't know whether or not those documents exist or not.
Q. Well, if it's true that site hygiene is what AT&T uses to cancel internal PIM, you've heard that. Right? That's what AT&T says its position is in the courtroom--it uses site hygiene to cancel internal PIM.

A. Yes, it is one of our tools.
Q. Yet you've activated internal PIM-C on over 60,000 radios. Correct?
A. Yes, we have.
Q. And you say it's effective. From the witness stand under oath you say it does cancel some PIM in the radio. Correct?
A. It can cancel PIM in some cases, yes.
Q. It can or it does, sir?
A. That's what I stated earlier is that it can in some cases.
Q. Well, have you seen it cancel internal PIM? Have you seen evidence that PIM-C cancels internal PIM in radios?
A. I think we have some test data that indicates that it has improved some cells, but not all.
Q. In some it has, then. Correct?
A. Yes.
Q. And you've got -- you're the one who has to raise your hand and testify under oath. Right?
A. Yes.
Q. It's one thing to sit out here and say things; it's another to raise your hand and have to testify. And that's what you're going to have to do. Correct?
A. Yes, I am.
MR. WARD: Let's look at PX 995. Oh, okay. This is fine.

Q. (BY MR. WARD) You see there in the bottom left it says 'restricted--attorneys eyes only'?
A. Yes, I do.
Q. And you know that's a marking that normally we wouldn't be able to show documents in open court that had that kind of classification. Right?
A. Yes.
Q. But for purposes of this trial we've agreed that we can show these documents. Do you understand that?
A. Yes, I do.
Q. But that's just taken effect once we got to trial. Correct?
A. Yes.
Q. So this is another Nokia commercial proposal to AT&T, September of 2019. Correct?
A. Yes, based on the PowerPoint.
MR. WARD: Let's look at the next page.
Q. (BY MR. WARD) So this is what Nokia is telling you that its radios can do for your network. Correct?
A. Yes.
Q. And the second bullet point says, "best ROI" -- do you know what ROI is?
A. Yes.
Q. Return on investment. Correct?
A. Yes.

Q. "Best ROI from AT&T's purchase of B29 spectrum." Correct?
A. That's correct.
Q. And 29, that's one of the channels in the tri-band radio. Right? You've got 12, 14, and 29.
A. Yes.
Q. And we're going to see some documents -- or have you seen some documents that talk about PIM occurring in the radios when these three bands are communicating together?
A. Yes, I have.
Q. Because another bold bullet point is 'built-in PIM cancellation'. Correct?
A. Yes.
Q. It will cancel wired PIM between three bands in the remote radio head. That's what that means. Correct?
A. Yes.
Q. So Nokia's telling you, We can help you get a better return on investment on your spectrum if you purchase these radios. Correct?
A. They make those two bullet points in this slide here, yes.
Q. And are we going to see correspondence from AT&T going back to Nokia saying, You-all have lied to us; these radios don't do these things?
A. No, I don't believe so.

Q. Why do you put things in bold in your presentations? For emphasis?
A. I try not to, but yeah, typically people put them for emphasis.
Q. With, yeah. They say this is an important selling point. Right? Pay close attention to this. In your experience is that why someone might put something in bold?
A. Yes, typically that's why.
Q. And you know as we sit here today it's AT&T's policy to turn PIM-C on on every dual band and tri-band radio that it purchases from Nokia that has PIM-C. Correct?
A. That's correct.
MR. WARD: Let's look at PX 582.
Q. (BY MR. WARD) And this is your field guide that tells your engineers what to do when they install these radios. Correct?
A. Yes.
Q. And what you're telling them is --
MR. WARD: Scroll down to the bottom, Mr. Boles.
Q. (BY MR. WARD) So we've got our accused radios. Right? AHFIB. You know that's one of the accused radios. Correct?
A. Yes.
Q. And then we've got AHLBA and AHLBBA. Those are the two dual bands and one tri-band that are accused of infringing in this case. Correct?

A. Yes.
Q. And this is the AT&T gold standard. Right?
A. Yes, it is.
Q. And what does the gold standard say about activating PIM-C on every one of its dual-band and tri-band radios?
A. We're supposed to set those values to true, which is enabling the feature.
Q. And that's as easy as toggling on a menu on a computer screen. Correct?
A. Correct.
Q. You can toggle it on and you can toggle it off. Correct?
A. Yes.
Q. And AT&T's position as we sit in this courtroom is turn it on on every radio. Correct?
A. For the radios that are in this document.
Q. Correct. For the radios that we're talking about in this lawsuit, turn it on.
A. Yes.
MR. WARD: Let's go to PX 611.
Q. (BY MR. WARD) You've seen this document before, Mr. Loddeke?
A. Yes, I have.
Q. This is an AT&T PIM presentation. Correct?
A. Yes.
MR. WARD: And let's go look at the next page.

Q. (BY MR. WARD) It's talking about external PIM mitigation. That's what it says on the cover -- or on the second page of the document. Correct?
A. Yes.
MR. WARD: All right. Let's go to the fifth page of this document.
Q. (BY MR. WARD) Okay. It's talking about intermodulation--"The mixing or two or more frequencies creates destructive interference, thus reducing footprint." Did I read that correctly?
A. Yes, you did.
Q. And that's true whether we're talking about external PIM or internal PIM. Correct? They can both reduce footprint.
A. Both can reduce footprint, yes.
Q. And bullet No. 3 says, "We have so many channels of our own in the network it is becoming more and more difficult to avoid these third order conflicts." Correct?
A. That's what it says there, yes.
Q. And some of those channels that we've been talking about are 12, 14, and 29. You know there are documents within AT&T that talk about those three channels mixing together to create third order conflicts. Correct?
A. Yes.
Q. And that's an internal PIM problem. Correct?
A. It can be an internal PIM problem if there is something

that's broke.

MR. WARD: Let's go to the next slide.

Q. (BY MR. WARD) So we've got 'yesterday's issues' up here in the top left. Correct?

A. Yes.

Q. And then we've got 'today's issues'. Do you see where I'm reading?

A. Yeah, I see it.

Q. And then it's got an arrow drawn in there that says 'third order PIM', and then it's pointing down to 'today's issues'. Do you see that?

A. Yes.

Q. And it says, "Signals that fall in this area do impact the footprint of the cell by limiting the receiver's ability to hear the mobiles. A 6 decibel increase in noise reduces the footprint by 50 percent." Correct?

A. That's what it states here.

Q. You disagree whether this is an accurate statement. Right?

A. My opinion is that you have to have something broken in the -- either in the feed line itself or you have some sort of an external issue that's causing this.

Q. That's not what the document says, though. Correct?

A. It states -- the document states what it has here.

Q. Right. And it was authored by Mr. Hollister. Correct?

A. Yes.
Q. He's an engineer at AT&T?
A. Yes, he is.
Q. And he's competent and qualified. Correct?
A. Yes, he is.
MR. WARD: And let's go to the next page. Actually the next one from that. Can we blow up this reduced footprint?
Q. (BY MR. WARD) Reduced footprint. When we're talking about footprint, that's talking about how much area is being broadcast with these radios that can communicate with a good signal to the cell phone. Correct?
A. Yes.
Q. So if you have a reduced footprint, the document is saying the problems with the reduced footprint or you have to have potentially more sites to cover the same area. Correct?
A. Yes.
Q. You have more capital costs and operating costs because you're having to service more radio towers. Correct?
A. That's what's stated here, yes.
Q. Less reliability. Correct?
A. Yes, that's what it states.
Q. And reduced return on investment on spectrum and site investment. Correct?
A. That's what's stated here.

Q. So it's not just Doctor Bazelon that thinks that if you don't have all your available spectrum you're not getting everything you paid for. Correct?
A. Well, I think, again, if you -- most of this document actually refers to external PIM and not internal PIM.
Q. I agree with you, but you agree with me that you can have -- external and internal can refer to this interference from 12, 14, and 29. Correct?
A. Correct.
Q. And this is all going in 2018.
MR. WARD: Go back to the first page, Mr. Boles. Maybe the next page. There we go.
Q. (BY MR. WARD) September of 2018 when this presentation came out. Correct?
A. That's correct.
MR. WARD: And let's look at DX 93. Go to the next page. Next page. This isn't the document I wanted.
Q. (BY MR. WARD) My apologies Mr. Loddeke.
MR. WARD: Let's take that down.
Q. (BY MR. WARD) You were present during the testimony of Mr. Coleman, a Nokia engineer. I'm sorry. Mr. Calloway, Michael Calloway. Did you see his testimony?
A. Yes, I did earlier.
MR. WARD: Can we have that demonstrative, Mr. Boles?

Q. (BY MR. WARD) Do you remember this gentleman testifying?
A. Yes.
Q. And he said he worked for Nokia, cell system engineer, that he meets with representatives of AT&T. And did you hear when he said it was the first time that he'd heard of the phrase passive intermodulation?
A. Yes, I heard what he said.
Q. 2018.
A. Yes.
Q. And that's one of the engineers at Nokia that was working with AT&T on developing these tri-band and dual-band radios with PIM-C. Correct?
A. I don't know if he specifically was working on that or not. I don't know his background.
Q. Does it surprise you that there is not a lot of economists that have studied PIM-C when Nokia's engineers weren't even aware of it, hadn't heard of intermodulation until 2018?
A. I wouldn't expect an economist to.
Q. It's a pretty new phenomenon. Correct? It's become more of a problem as of late. Correct?
A. It's not new but it's -- you know, again, I think as time goes on you have the potential for more PIM to be present.
Q. Well, AT&T starts addressing it in 2018. Correct? They create a task force. Correct?

A. I wouldn't say that's the only time we've had to address PIM, though.
Q. Has it become more of a problem as usage on your networks has increased?
A. I wouldn't say it's related to the usage; I think it's, just again, as we move towards more and more dual-band radios we've had more mixing of frequencies.
Q. Would you agree with me that most of the documentation, the PowerPoints, the correspondence that we see within AT&T about the problem of PIM and the need for PIM-C start occurring in 2018 and later?
A. It doesn't surprise me.
Q. And you heard Mr. Smith say that he'd been warning folks about this is going to be a problem since way back in 2001 or 2002.
A. Yeah, I heard him say that.
Q. Do you think he wasn't saying that to people?
A. No, I have no doubt that he was saying it. I mean, I was aware of PIM back 2000 as well.
Q. You think maybe he was ahead of his time with his patents?
A. I can't say that.
Q. You think that some of the best and brightest engineers might be somewhere other than AT&T or Nokia when it comes to inventing ways to deal with PIM-C?

A. It's possible.

Q. Now, you've had -- you've expressed some of your own opinions about PIM-C, haven't you?

A. Yes, I have.

MR. WARD: Let's pull up Plaintiff's Exhibit 669. And if you'll blow that top paragraph.

Q. (BY MR. WARD) This is an email from you dated April the 2nd of 2021. Correct?

A. Yes.

Q. And we've seen Mr. Gavin's name, and we heard deposition testimony from Mr. Edwards. Correct?

A. Correct.

Q. And we can -- if you want to look at the whole email we can, but I think you've probably familiar with this to the fact that you-all were debating internally about what the best way to deal with PIM-C or what the best PIM-C solution was, whether it would be in the radio or in the baseband.

A. Yeah, we were, you know, looking at both internal and external PIM and how it's handled by the vendors.

Q. And what you've written here starting in the second sentence, you said, "I suspect Horman will make the pitch that Ericsson should make a tri-band radio with PIM-C."

A. Yes that's what I stated.

Q. Who's Horman?

A. Jim Horman is an assistant vice president in our New York

City market.
Q. Okay. And so we've heard -- we just heard about how Ericsson doesn't have PIM-C in its radios.
A. That's correct.
Q. But you-all were discussing internally that at least someone within AT&T thought that we should ask Ericsson to put PIM-C in its radios.
A. Yes.
Q. And what you wrote in that next paragraph, you said, "I still believe from an initial deployment perspective PIM C inside the radio is preferable because it's easier and simplifies potential tower issues." You wrote that. Those are your words. Correct?
A. Yes, I did.
Q. And then the next sentence you said, "If additional PIM-C is required, then deploy the PIM-C at the baseband." Right?
A. Yes.
Q. So you said if additional PIM-C, if additional PIM, cancellation is required. That's what 'additional' means. Correct?
A. Yes.
Q. Because you said, Initially let's deploy PIM-C inside the radio. Right?
A. That's what I stated.
Q. And if we need more cancellation, we can put it in the

baseband. That's what you wrote here. Correct?
A. Correct.
Q. So at least according to this email you acknowledge that there is some PIM cancellation going on inside the radio when you had this feature turned on. Correct?
A. When there's an issue, yes.
Q. Let's talk about your -- AT&T's relationship with Nokia. AT&T and Nokia do a lot of business together. Correct?
A. Yes.
Q. AT&T buys billions of dollars of equipment from Nokia. Correct?
A. Yes, we do.
Q. But Nokia has competitors, doesn't it?
A. Yes, they do.
Q. And, in fact, AT&T buys more of its radios in its network currently from Ericsson.
A. Yes, we do.
Q. So you had choices. AT&T has choices to make about who to buy from. Correct?
A. Yes, we do.
Q. Do you think Nokia wants to keep AT&T's business?
A. Yes, I would believe so.
Q. And you think Nokia wants to keep AT&T happy?
A. Probably so.
Q. Now, Nokia is in this courtroom standing shoulder to

shoulder with AT&T. Correct?
A. Yes, they are.
Q. And one of the reasons that they're here is because AT&T demanded that they be here. Correct?
A. I believe that might be the case.
Q. Well, they demanded -- AT&T has demanded that they be here. Are they covering your attorneys' fees?
A. I can't say for certain on that, but I suspect it's possible. I just -- I'm not part of those negotiations.
Q. Well, and if AT&T incurs any damages, they're going to make a demand on Nokia to pay it, aren't they?
A. I suspect that might be the case, but again, I'm not part of those discussions.
Q. Isn't that why Nokia's in this courtroom--because AT&T has demanded it?
A. I don't think it's because we demanded it, but obviously their product is part of this discussion.
Q. You think this company that sells you billions of dollars of equipment would ignore your demand to show up in a courtroom?
A. I wouldn't expect they would.
Q. Now, it's true that AT&T and Nokia kind of got together and put their heads together to try and solve the problem of PIM in its radios. Correct?
A. I'm not certain if in the very beginning if it was Nokia

coming to AT&T or if it was a joint discussion. I can't say how it started.

MR. WARD: Let's look at Plaintiff's Exhibit 672R, Mr. Boles.

Q. (BY MR. WARD) All right. This is an email it looks like from Mr. Edwards to Mr. Gavin, and you're CCed on it. Correct?

A. Yes, I am.

Q. And it says, "After reviewing the PowerPoint"--and there's a PowerPoint attached to this email, I'll represent to you--we need to be more explicit with Ericsson so we get what we actually need." Do you see that?

A. Yes.

Q. And in the subject line it says 'tri-band remote radio head from Ericsson'. Correct?

A. That's correct.

Q. And it's talking about -- for Ericsson radios AT&T is talking about "PIM mitigation will have to be defined internal and port to port." Correct?

A. That's what is stated in Dan's email.

Q. And he's talking about putting PIM cancellation in an Ericsson remote radio head. Correct?

A. Yes, that's -- well, I suspect that's what he's referencing here.

Q. Now, this 'by the way' down here, it says, "There are two

documents attached to the AHLBBA." That's a Nokia document. Correct? "That are not to be shared with Ericsson." Correct?

A. That would be my assumption that they're Nokia documents.

THE COURT: Let me ask you to pull the microphone a little closer, Mr. Loddeke. And this is the second time you've called Dan Edwards Dan. Please stop using first names only.

THE WITNESS: Sorry, Your Honor.

THE COURT: All right. Let's continue.

MR. WARD: Let's go to page 2 of this document.

Q. (BY MR. WARD) And in this document, the very first paragraph--we'll blow that out, PIM-C in the radio--it's talking about tri-band radio with PIM-C. It says, "PIM-C in the radio reduces the number of antennas and associated hardware on the tower or rooftop and this creates an environment that is less susceptible to PIM. Correct?

A. That's what it states there.

Q. And this document, of course, is outside the courtroom. Right? Wasn't created in this courtroom. It was created outside the courtroom. Right?

A. Correct.

MR. WARD: Let's look at another document, Mr. Boles. Plaintiff's 690. No. 690, Mr. Boles.

Could it have the document camera?

Q. (BY MR. WARD) I show you this document that's

Plaintiff's Exhibit 690. You see it's another email from Mr. Edwards, subject PIM mitigation. Do you see that?
A. Yes, I do.
Q. And it's got a PowerPoint attached to it, and I'll show it to you. And this is from the third page of that document. And the title of this one is 'PIM mitigation--cancellation in radio versus cancellation in baseband'. Do you see that?
A. Yes, I do.
Q. And what I want to focus in on is this bottom paragraph down there. It says, "Ericsson pursued PIM-C in the baseband and delivered the P614 in September of 2018." Do you see that?
A. Yes, I do.
Q. We see that 2018 date again. Right?
A. Yes.
Q. And they delivered a radio in 2019. "This band combination does not require radio based PIM-C." That's what it says. Correct?
A. Yes.
Q. And then it says, "Radio-based PIM-C is now planned for 2022+." Am I reading that right?
A. Yes, you are.
Q. "Which probably mean 2023, unless AT&T pushes this as a high priority." Correct?
A. Correct.

Q. And so this document--you correct me if I'm wrong--is talking about the plan is for Ericsson to provide PIM-C in its radios starting in 2023.
A. Yes. I mean, I guess you could draw that from this document.
Q. And then flipping ahead to page 7 of that document, have you seen this before?
A. I believe so.
Q. And it's talking about the AHLBBA, Nokia's tri-band remote radio head. Correct?
A. That's correct.
Q. And I think we saw this document discussed in one of the depos where there was a discussion about developing a tri-band radio and that there were five things that needed to be considered. Do you recall that testimony?
A. Yes.
Q. And right up here it says, "We came up with an idea of combining all of the frequencies into one remote radio head." Correct?
A. Yeah. I'm not sure if that is in reference to AT&T or Nokia or if it's joint.
Q. Okay. But again, it's talking about these multiple bands, band 17 -- 12, 17, and 29. Correct?
A. That's correct.
Q. And the goals that were being talked about in this

document, the third one there is PIM mitigation between all the 700 megahertz bands had to be addressed. Correct?
A. Yes, that's what's in the document.
Q. And right up on the top there it says one major feature was to make sure the remote radio head had PIM mitigation included. Did I read that correctly?
A. Yes.
Q. "Which reduces the interference generated by combining the 700 megahertz frequencies at one site."
A. That's what it states there.
Q. And that's talking about reducing internal PIM in the radio from combining these bands in the 700 megahertz frequency range. Correct?
A. Again, that's assuming you have some sort of internal PIM issue to begin with.
Q. That's not what the document says, is it, Mr. Loddeke? It says, Interference generated by combining the frequencies; that when you combine these frequencies you get interference?
A. That's what it states here.
Q. And then it's got a comment in it from Mr. Jim Horman. We saw his name earlier. Correct?
A. Yes, we have.
Q. And he's -- this is an excerpt from an email. Correct?
A. Yes it is.
Q. And the subject is that Nokia tri-band radio with the

frequencies 14, 12, 29. Correct?
A. Yes.
Q. And Mr. Horman writes, "Really good stuff here and thanks to all involved in developing this product. I sure wish we had the same with Ericsson." That's what Mr. Horman wrote. Correct?
A. Yes.
Q. And along with the deployment of antennas that reduce the side lobe reflective energy back in the antenna system on rooftop sites is allowing us to run three bands at full power in New York City, which is the most PIM challenged environments in North America. Correct?
A. That's what he states here.
Q. And he says it's the PIM cancellation feature in combination with some antennas is what's allowing them to do this. Correct?
A. I wouldn't say that's the only thing.
Q. And I agree it's not the only thing. It is one of the ways to reduce internal PIM, though, at least according to this document. Correct?
A. Again, I think there's a little more than just that sentence, but yes.
Q. There is more than that sentence. Because he goes on to say, this product -- talking about Nokia's tri-band radio with PIM cancellation, he says, "This product makes band 29 much

more valuable to AT&T, particularly in Nokia markets." Correct?
A. That's what it states there, yes.
Q. And band 29 is talking about spectrum, isn't it, Mr. Loddeke?
A. Yes, it is spectrum.
Q. And he's saying it makes it more valuable to have a radio with PIM-C in it. That's what he says in the document.
A. I can't say I completely agree the radio is the reason for the value of -- the PIM-C is the value for the band 29, though.
MR. WARD: Objection; non-responsive.
THE COURT: Overruled.
Q. (BY MR. WARD) What the document says, Mr. Loddeke, is "This product makes band 29 much more valuable to AT&T, particularly in Nokia markets." That's what it says. Correct?
A. That's what that sentence says, yes.
Q. And you were present during Doctor Bazelon's testimony. Correct?
A. Yes, I was.
Q. And you don't dispute that AT&T spends 10s of billions of dollars acquiring spectrum, do you?
A. No, I don't disagree with that.
Q. It's very expensive and it's getting more expensive, is

it not?
A. Yes, I would say so.
Q. It's a finite resource and there's a lot of demand for it. Correct?
A. Yes.

MR. WARD: Your Honor, that's all I have right now. Pass the witness.

THE COURT: All right. Ladies and gentlemen, I expect a fairly lengthy cross examination of this witness, so we're going to break for the day at this juncture. We'll start in the morning with cross examination of this witness by AT&T and Nokia. And as you know, he's the representative of AT&T in this trial.

So as you leave the courtroom, please take your notebooks with you. Leave them closed on the table in the jury room so they'll be there in the morning. Please follow all my instructions, including not to communicate with anybody in any way, including the eight of you, about this case. Please travel safely to your homes.

Thank you for being here promptly this morning. If you'll do the same thing tomorrow. Be assembled by around 8:15 and ready to start as close to 8:30 as possible, we will be back and continue with the trial in the morning.

With that, the jury's excused for the evening at this time.

(Whereupon, the jury left the courtroom.)

THE COURT: Be seated, please.

You can step down, sir.

THE WITNESS: Okay.

THE COURT: Counsel, for your information, we've used 7 hours 1 minute and 3 seconds of trial time today. Over the course of the trial so far Plaintiff has used 7 hours 2 minutes and 46 seconds and has 3 hours and 57 minutes and a few seconds of remaining trial time. Defendants used 2 hours and 32 minutes and has 8 hours, 27 minutes, almost 28 minutes in remaining trial time.

Let me remind you to continue your meet and confer efforts. I'll be available in the morning if necessary. We'll follow the same process and protocol as we have.

I'll also remind you of my instruction to submit an updated and jointly revised proposed final jury instruction and verdict form by 3:00 tomorrow.

Are there questions before we recess for the day?

Mr. Dacus, you're on your feet. Do you have something?

MR. DACUS: Yes, Your Honor, very briefly.

THE COURT: Let's start with you.

MR. DACUS: Thank you.

As the Court knows, in chambers this morning we had a discussion about potential admission of the covenant not to sue and license between Verizon and the Plaintiff Finesse.

The Court sustained the Plaintiff's objection to that introduction. I would like to make an offer of proof on that. I'm just trying to get guidance from the Court. It won't take literally --

THE COURT: We did discuss it in chambers. I told you that I thought going into the actual litigation and resulting covenant not to sue was more prejudicial than it was probative. I did allow you to go into the fact of what Finesse knew by way of that process without identifying the source of the knowledge, and you've done that I think fairly effectively in the examination that took place today. If you would like to formalize the discussion of the ruling on the record, I'm always happy to help a lawyer preserve anything they think they need to preserve.

MR. DACUS: We would like to do that. We don't have to do it now, Your Honor.

THE COURT: Whenever you're ready to make an offer of proof outside the jury's presence, let me know and we'll get it done.

MR. DACUS: Thank you. And it will be very short. Thank you.

THE COURT: Is there anything from Plaintiff before we recess?

MR. GRINSTEIN: Nothing from Plaintiff, Your Honor.

THE COURT: All right. Then we stand in recess

until tomorrow morning.

(The proceedings were concluded at 5:45 p.m.)

I HEREBY CERTIFY THAT THE FOREGOING IS A CORRECT TRANSCRIPT FROM THE RECORD OF PROCEEDINGS IN THE ABOVE-ENTITLED MATTER. I FURTHER CERTIFY THAT THE TRANSCRIPT FEES FORMAT COMPLY WITH THOSE PRESCRIBED BY THE COURT AND THE JUDICIAL CONFERENCE OF THE UNITED STATES.

S/Shawn McRoberts 01/10/2023

__________________________DATE____________
SHAWN McROBERTS, RMR, CRR
FEDERAL OFFICIAL COURT REPORTER